CA INTERMEDIATE

COST AND MANAGEMENT ACCOUNTING

CA Sunil Keswani

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PREFACE

A highly skilled professional team of CA Wallah works arduously to ensure that the students receive the best content for their CA-Intermediate exams.

A plethora of CA Study Material is available in the market but CA Wallah professionals at PW are continuously working to provide supreme quality study material for the CA-Intermediate students.

From the beginning, the content team comprising Subject Matter Experts, Content Creators, Reviewers, DTP operators, Proofreaders, and others is involved in shaping the material to their best knowledge and experience to produce powerful content for the students.

CA Wallah Faculties have adopted a novel style of presenting the content in easy-to-understand language and have provided the content team with expert guidance and supervision throughout the creation and curation of this book.

PW's CA Wallah strongly believes in conceptual and fun-based learning. CA Wallah provides highly exam-oriented content to bring quality and clarity to the students.

This book adopts a multi-faceted approach to mastering and understanding the concepts by having a rich diversity of questions asked in the CA-Intermediate examination and equipping the students with the knowledge for this highly competitive exam.

The main objective of this book is to provide an edge to your preparation with short & crisp yet high-quality content.

BOOK FEATURES

This book, especially designed & amended for CA-Intermediate aspirants, contains:

- Syllabus coverage strictly as per ICAI study Material
- All ICAI Study Material Questions
- Latest RTP & MTP Questions
- Detailed Theory with Exam prototype and Concept Applications Questions
- Short Notes and Solve Miscellaneous Examples
- Topic wise, Learning Plus and Advanced Level Questions covered in the Book
- Elaborated Solutions

ABOUT THE AUTHOR

Sir, CA Sunil Keswani is a highly accomplished professional in the field of finance and accounting. He is a fellow member of the Institute of Chartered Accountants of India (ICAI), having qualified in 2010. Sunil Keswani furthered his education by completing the Master of Financial Analysis Program from the Institute of Chartered Financial Analyst of India University, earning the prestigious title of Chartered Financial Analyst. He also obtained a Bachelor of Commerce degree from Delhi University in 2007.

As a practitioner, Sunil Keswani has amassed valuable experience in various roles. He worked as a Regional Credit Manager at ICICI Bank, where he honed his skills in credit management and risk assessment. He also served as a speaker at the Comptroller and Auditor General of India (CAG), sharing his expertise and insights with a wider audience. Thus, he has excelled as a Financial Planner for the past nine years, helping individuals and organizations effectively manage their finances and achieve their goals.

With a passion for teaching, Sunil Keswani Sir has dedicated over 13 years to educating students in the fields of Cost Accounting, Management Accounting, and Financial Management. He has extensive experience in both face-to-face and online coaching methods, imparting knowledge and guiding students towards success. He has also served as a faculty member of ICAI, where he conducted classes on cost accounting and financial management in Delhi. His exceptional teaching abilities have been recognized, and he has been awarded as the best faculty by NIRC-ICAI.

His impact extends to his students, with 70 of them securing All India Ranks in the CA Examination. Notable achievers include Swati Bansal (AIR-1, CA Foundation, May 2018), Deepa Jain (AIR-1, May 2018), Parth Gupta (AIR-3, May 2018), Raghvendra Prasath (AIR-3, May 2019), and Swati Bansal (AIR-4, Nov 2019) among others. Additionally, 150 students have achieved perfect scores in the subjects of cost accounting, management accounting, and financial management at their graduation level, a testament to Sir Sunil Keshwani's effective teaching methods and guidance.

CONTENTS

CHAPTER 1

Introduction to Cost and Management Accounting

Costing	• It is defined as "the technique and process of ascertaining costs".
Cost Accounting	• It is defined as "the process of accounting for cost which begins with the recording of income and expenditure or the bases on which they are calculated and ends with the preparation of periodical statements and reports for ascertaining and controlling costs". • The emergence of cost accounting is due to limitations of financial accounting to meet the informational needs of the management.
Cost Accountancy	• It is the application of costing and cost accounting principles, methods and techniques to the science, art and practice of cost control and the ascertainment of profitability. It includes the presentation of information derived therefrom for the purpose of managerial decision making.
Management Accounting	• It is "the application of the principles of accounting and financial management to create, protect, preserve and increase value for the stakeholders for profit and non-profit enterprises in the public and private sector." It assists management by provision of relevant information for planning, organizing, controlling, decision making etc.
Cost Management	• It is the application of concepts of management accounting to provide the information needed to plan, monitor and control costs.
Objectives of Cost Accounting	• Cost Ascertainment – It helps in arriving at cost of production of each individual unit of production or job or operation or process or department or service • Fixation of Selling Price – It act as very important basis of fixing the selling price because many a time the pricing of the product is done on the basis of cost of production. • Helps in Estimating – It helps in estimating the cost and profit to arrive at prices in cases such as contracts or jobs where tender or quotations are to be given.

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Cost Control – 'Control' means that Plans and actions should confirm each other. From Cost Accounting, the managers at various level in the organization are able to control costs as well.
Cost Reduction – It means to achieve permanent reduction in cost by using new technology or methods without affecting the quality of the product or services.
Assisting Management in Decision Making – It assist management in taking long-term as well as short term decisions by providing data or information.

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<tr><td>Cost Control</td><td>

It aims to ensure that costs are incurred within the predetermined standards.
If there are any variations than same should be reported on continuous basis.
Following steps are required for cost control:

Determination of predetermined standard or results
Measurement of actual performance
Comparison of actual performance with set standard or target
Analysis of variance and action

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<tr><td>Cost Reduction</td><td>

It aims to reduce cost permanently by using new method or technology without affecting the quality.
Following actions can be taken for cost control:

An entity classifies various activities in the organization
Classification of value added and non-value added activities are done
Non-value added can be removed without affecting the characteristics of the product

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<tr><td>Distinguish between Cost Control and Cost Reduction</td><td>
<table>
<tr><th>COST CONTROL</th><th>COST REDUCTION</th></tr>
<tr><td>1. Cost control represents efforts made towards achieving a target or goal.</td><td>1. Cost reduction represents achievements in reduction or cost.</td></tr>
<tr><td>2. The process of cost control is to set up a target, investments the variances/variations and taking remedial measures to correct them.</td><td>2. Cost reduction is not contended merely with maintenance of performance according to the standards.</td></tr>
<tr><td>3. Cost control assumes existence of standard of norms which are not challenged.</td><td>3. It assumes the existence of concealed potential savings in the standards or norms which are therefore subject to constant challenge or improvement.</td></tr>
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	4. Cost control is a preventive function. Costs are optimized before they are incurred.	4. Cost reduction is a corrective function. It operates even when efficient cost control system exists. There is a room for reduction in the achieved costs.
	5. Cost control sometime lacks dynamics approach.	5. It is continuous process of analysis by various methods of all the factors affecting costs, efforts and functions in an organization. The main aim is to have continuous economy in costs.

Scope of Cost Accounting

- Costing
- Cost accounting
- Cost analysis
- Cost comparison
- Cost control
- Cost reports
- Statutory compliance

Difference between Cost Accounting and Financial Accounting

Basis	Financial Accounting	Cost Accounting
1. Objective	To provide information about profitability and financial position of the business.	To ascertain cost, control cost and to provide information for decision making.
2. Analysis of Costs and Profits	Shows the overall profit/loss of the entire organization.	Shows the detailed cost and profit for each product, job, contract etc.
3. Control	Emphasis is on reporting, not on control.	Emphasis is on control of various costs.
4. Decision-making	Limited use in decision making	Facilitate decision-making in the area of production, purchase, etc.
5. Relation to time	Historical in nature	Focus on present and future
6. Responsibility fixation	Don't provide any effective help in responsibility fixation.	Effectively help in responsibility fixation.
7. Legal Requirement	Have to meet requirements of the Companies Act and the Income Tax Act.	Preparation is voluntary except in a few cases where law makes it mandatory.

	8. Generality	Guided by generally accepted principles of accounting	Tailor made to suit needs of specific organization, division or even product and service.
	9. Person interested	The whole world is interested	Mainly for use internally by the management at different levels.
	10. Nature of transactions	Mainly record transactions with outsiders	Based on data available from financial accounts and that generated within the costing department.

Differences between Cost Accounting and Management Accounting

Point of Distinction	Management Accounting	Cost Accounting
1. Outlook	It is concerned with forecasting of the costs and hence it looks into future.	It is concerned with historical cost i.e. the cost which has already been incurred in past.
2. Scope	It has a broader scope and provides all type of information.	It has a limited scope to provide cost information only.
3. Emphasis	Its emphasis is on planning, controlling and decision making	Its emphasis is on cost ascertainment and cost control.
4. Statutory requirement	It is voluntary.	Cost records are compulsory to be prepared in case of certain industries or companies.
5. Data base	It is based on data derived from cost accounting, financial accounting and other sources.	It is based on data derived from financial accounting.
6. Installation	It can't be installed without proper cost accounting system.	It can be installed without management accounting system.

Users of Cost and Management Accounting

- **Internal Users**
  - ➢ Policy makers – They require data to achieve short & long term goals
  - ➢ Managers – They require data to know about the cost and price of product as well as to evaluate strategic options to make decisions

	➢ Operational level staff – They require data to know the product specifications, performance evaluation parameters, performance goals etc. ➢ Employees – They require data related with time, attendance, incentive, work performance etc. • **External Users** ➢ Regulatory authorities – They require data for tariff determination, subsidies calculation etc. ➢ Auditors – They require data to conduct audit for various purpose. ➢ Shareholders – They require data which affect their investment in entity. ➢ Creditors and lenders – They are concerned regarding entity's ability to pay to creditors or lenders.
Essentials of Good Cost Accounting System	• **Tailor made system –** The cost accounting system should be tailor made, practical, simple and capable of meeting the requirements of business concern. • **Simple –** It should be easy to understand and simple to operate. • **Accurate and authentic –** The costing system should accurate and authenticated data so that correct decision can be taken. • **Economical –** The cost of installing and operating the system should justify the results. • **Uniformity and consistency –** The data and its result should be uniform and consistent in classification, treatment of various items etc. • **Integrated and inclusive –** It should be integrated with other system like financial accounting, taxation etc. • **Trust on the system –** The management should actively participate for ensuring trust on the system and its output. • **Flexible and adaptive –** It should be flexible to adopt the changing requirements of the business.
Factors for Installing a Cost Accounting System	• **Objectives –** The objectives of installing a costing system and the expectations of the management from the system should be identified first. • **Study of variables –** It is important to ascertain the significant variables of the manufacturing unit which are amenable to control and affect the concern. • **Nature of business or industry –** A thorough study of the nature of business, its technical aspects, products, methods and stages of production should be made. This will help in selecting a proper method of costing. • **Organizational hierarchy –** A study for the organization structure, its size and layout etc. is also necessary. This is useful to management to determine to the scope of responsibilities of various mangers. • **Knowing the product –** Type of costing system to be used mainly depends on the type of product of the company. In case of by-products, process costing is used. In case of perishable product, marginal costing is appropriate.

	• **Knowing the production process –** Complete knowledge of production process is required to include technical know-how, process peculiarity, resources consumption etc. • **Information Synchronization –** The information needs of various department should be known so that it can be designed to produce the desired results for all whenever required by them. E.g. stock statement is required by accounts department for submitting to bank. • **Methods of maintenance of cost records –** Details of the records to be maintained by the costing system should be carefully worked out. The degree of accuracy of the data to be supplied by the system should be determined. • **Statutory compliance and audit –** The records and reports required for compliance and audit should be there in the system and available whenever required. • **Information attributes –** The data generated should be complete, accurate, relevant and timely to have an effective management information system (MIS)
Information Technology (IT) Usage with Cost Accounting	• **Use of Internet –** With the use of internet (intranet and extranet), different departments are linked within the company as well as with supplier's network so that resource procurement and mobilization can be done in paperless form and that too in a lesser time. • **Introduction to ERP –** With ERP, different functions of entity gets integrated and a single entry in the system serves every purpose for creation of various required reports. This leads to saving in preparing different set of documents. • **Paperless Environment –** With the introduction of IT, various documents like bill of material, material requisition etc. are not required to be printed in multiple copies. E-copies of the document are sent to the related department from the system. • **Accuracy of data –** With IT introduction, each cost center, cost object is codified and all costs related to it are assigned to it using the same code. This automates the process of calculation of total cost as per the requirement like job-wise, batch-wise etc. • **Uniformity of reports –** With the ERP software, uniformity can be achieved in all reports in terms of location, currency, language etc. • **Real time reports –** With ERP, all reports can be generated in real time which enables the management to implement control measures immediately.
Digital Costing System	• It is different from conventional cost accounting system in terms of method of collection, medium of storage, forms of analysis and reporting. • It links different business functions with the digital costing system of its supplier, customer and market through data sharing and network connection.

Benefits of Digital Costing System	• Ascertainment of cost with certainty on cost object. • Analysis of data on time spent on each activity to study and formulate incentive plans. • Helps in material requirement planning and scheduling the material procurement. • Helps to identify and eliminate the non-value-added activities. • Helpful in setting the standards • Improves the cost benefit analysis.
Meaning of Cost	• It is the amount of expenditure (actual or notional) incurred on, or attributable to, a given thing. However, the term 'cost' cannot be exactly defined. Its interpretation depends upon: (a) the nature of the business, or industry, and (b) the context in which it is used.
Meaning of Expenses	• It refers to sacrifice, the renouncing aspect of a revenue transaction. Expenses are matched with revenue to determine income.
Cost Object	• It is anything for which a separate measurement of cost is required. It may be a product, a service, a project etc. • It remains in nucleus of cost classification and analysis of the cost behaviour.
Cost Unit	• A cost unit is a unit of product, service or time in terms of which costs are ascertained or expressed. It is basically a unit of measurement like number (per 100 bricks), weight, length, volume, time etc. Its selection depends on the nature and type of industry.
Cost Driver	• It is an activity which is responsible for cost incurrence. • In other words, it is a factor or variable which effect level of cost. • E.g. machine set ups, number of purchase order etc.
Responsibility Centres	• It is any part or department or persons of an organization to which a particular responsibility is assigned and are help responsible for performance. • It can be of four types i.e. cost centre, revenue centre, profit centre and investment centre.
Cost Centre	CIMA London has defined cost centre as, "a production or service location, function, activity or item of equipment whose costs may be attributed to cost units." In other words, when a manager is held accountable for costs incurred in a responsibility centre, it is called cost centre but the revenue earned are excluded from its purview. For example, the maintenance department of a retail store may be a cost centre. Cost centres are of two types viz. Standard and Discretionary • **Standard cost centre –** It is a cost centre where output is measurable and input-output ratio is clearly defined. The actual cost of output is compared with already set standard and any variation is analyzed into controllable and uncontrollable cost. The manager is held responsible for variances in the cost. For example, production department, sales department etc.

	• **Discretionary cost centre –** It is a cost centre where output is not measurable in financial terms and input-output can't be defined. The actual costs are compared with the budgeted costa and manager is held responsible for variances. For example, advertisement department, research & development department etc
Revenue Centre	When a manager is held accountable for revenues incurred in a responsibility centre, it is called revenue centre. The control over costs and investment are outside the purview of the manager of revenue centre. Revenue centre may control selling prices, product mix and promotional activities to enhance revenues. For example, sales department of a retail store may be taken as a revenue centre.
Profit Centre	It is defined as an activity center of a business organization. Chief of such a center is fully responsible for all costs, revenues and profitability of its operation. The main objective of profit center is to maximize the centre's profit.
Investment Centre	It is defined as a centre which is concerned with earning an adequate return on investment. The main objective of an Investment Centre is to maximize the earnings in relation to investment/capital employed.
Limitations of Cost Accounting	• Expensive • Requirement of reconciliation • Duplication of work
Classification by Nature or Element	• **Direct Material –** It is the material which are present in the finished product or can be economically identified in the product. • **Direct Labour –** It is the labour which can be economically identified or attributed wholly to a cost object. • **Direct Expenses –** All expenses other than direct material or direct labour which are specially incurred for a particular cost object and can be identified in an economically feasible way are termed as direct expenses. • **Indirect Material –** It is the material which do not normally form part of the finished product. • **Indirect Labour –** It can't be allocated but can be apportioned to cost units or cost centres. • **Indirect expenses –** Expenses other than direct expenses are known as indirect expenses. • **Overheads –** it is the sum total of indirect material, indirect labour and indirect expenses. It is further divided into production overheads, administrative overheads, selling overheads and distribution overheads.
Classification According to Functions	• Prime Cost = Direct material + Direct labour + Direct expenses • Factory cost = Prime Cost + Production Overheads • Cost of Goods Sold = Factory cost + Administrative Overheads • Cost of Sales = Cost of goods sold + Selling & Distribution overheads

Classification According to Variability/ Behavior	• **Fixed Cost –** These costs remain fixed in total and do not increase or decrease with the volume of production, but the fixed cost 'per unit' increases when the volume of production decreases, and vice versa. Some examples are Factory Rent, Insurance etc. • **Variable Cost –** These costs change in proportion to the volume of production. In other words, when volume of output increases, total variable cost also increases, and vice versa. But the variable cost per unit remains fixed. Some examples are cost of raw materials, direct wages, etc. • **Semi-Variable or Semi-Fixed Cost –** These costs are partly fixed and partly variable. A semi-variable cost has often a fixed element below which it will not fall at any level of output and the variable element changes either at a constant rate or in lumps. Some examples are repairs and maintenance, supervision charges etc.
Methods of Segregating Semi-Variable Cost into Fixed and Variable Cost	• Graphical Method • High-low method • Analytical method • Comparison by period or level of activity method • Least squared method
Classification According to Controllability	• **Controllable Costs –** These are those which can be influenced by the action of a specified member of an undertaking. Variable costs are generally controllable by department heads. For example, direct labour, direct materials, direct expenses and some of the overhead may be controlled by shop level management. • **Uncontrollable Costs –** These are those which cannot be influenced by the action of a specified member of an undertaking. Fixed costs are generally uncontrollable. For example, it is very difficult to control costs like factory rent, managerial salaries, apportioned fixed costs, etc.
Classification According to Normality	• **Normal Cost –** It is the cost which is normally incurred at a given level of output in the conditions in which that level of output is normally attained. It is treated as a part of cost of production. For example, cost of material required as per standard, cost of labour required as per standard etc. • **Abnormal Cost –** It is the cost which is not normally incurred at given level of output in the conditions in which that level of output is normally attained. It is not treated as part of cost of production and is charged to costing profit & loss account. For example, cost of abnormal material, fines, penalties etc.
Classification According to Managerial Decision Making	• **Pre-determined Cost –** It is computed in advance before production or operations start, on the basis of specification of all the factory affections cost. • **Standard Cost –** It a pre-determined cost which is calculated from managements' expected standard of efficient operation. It may be used as basis for price fixation and for cost control through variance analysis.

	• **Marginal Cost –** It is the total variable cost i.e. prime cost plus variable overheads. It is the total cost incurred for producing an extra unit of output. • **Estimated Cost –** It is the expected cost of manufacture, or acquisition, often in terms of a unit of product computed on the basis of information available in advance of actual production or purchase. • **Differential Cost –** It is the change in costs due to change in the level of activity or pattern or method of production. Where the change results in increase in cost it is called incremental cost, whereas if costs are reduced due to decrease of output, the difference is called decremental costs. • **Imputed Cost –** These costs are notional costs which do not involve any cash outlay. These costs are similar to opportunity costs. • **Capitalized Cost –** These are costs which are initially recorded as assets and subsequently treated as expenses. • **Product Cost –** It is associated with purchase and sale of goods. Under marginal costing it is variable manufacturing costs and under absorption costing it is total manufacturing cost (variable and fixed). • **Opportunity Cost –** It refers to the value of sacrifice made or benefit of opportunity foregone in accepting an alternative course of action. Opportunity cost is a relevant cost where alternatives are available. It is computed only for decision making and analytical purposes. • **Out-of-pocket Costs –** These are costs which entail current or near future outlays of cash for the decision at hand as opposed to costs which do not require any cash outlay such as depreciation. Such costs are relevant for decision-making, as these will occur in near future. • **Shut down Cost –** These cost continue to be incurred even when a plant is temporarily shut-down. These cannot be eliminated with the closure of the plant. • **Discretionary Costs –** These are the costs, which may be avoided in the short run by management decisions. For example advertising, research and development costs. • **Sunk Cost –** These are historical costs which are incurred in the past. These costs are the costs of resources already acquired which will be unaffected by choice between various alternatives. These costs play no role in decision making, in the current period. • **Absolute Cost –** It costs refer to the cost of any product, process or unit in its totality. • **Period Cost –** These are the costs which are not assigned to the products but are charged as expenses against the revenue of the period in which they are incurred. • **Engineered Cost –** These are costs that result specifically from a clear cause and effect relationship between inputs and outputs. • **Explicit costs –** These costs are also known as out-of-pocket costs and refer to costs involving immediate payment of cash. • **Implicit Costs –** these costs do not involve any immediate cash payment. They are not recorded in the books of account. They are also known as economic costs.
Job Costing	It is a method of costing which is used when the work is undertaken as per the customer's special requirements. It is generally applied in engineering industries, construction industries, tailor, printer etc.

Batch Costing	In the case of batch costing separate cost sheets are maintained for each batch of products by assigning a batch number. Cost per unit in a batch is ascertained by dividing the total cost of batch by the number of units produced in that batch. It is generally applied in ready-made garments manufacturing industries, medicine manufacturing, toys manufacturing etc.
Contract Costing	If a job is very big and takes a long time for its completion, then method used for costing is known as contract costing. Here the cost of each contract is ascertained separately. It is suitable for firms engaged in the construction of bridges, roads, building etc.
Process Costing	It is a method of costing under which all costs are accumulated for each stage of production (also called process of production) and the cost per unit of product is ascertained at each stage of production by dividing the total cost of each process by the normal output of that process. It is generally applied in paper industries, chemicals industries, sugar industries etc.
Operating Costing	It is concerned with the determination of the cost of each operation. Operation costing offers scope for control. It facilitates the computation of unit operation cost at the end of each operation by dividing the total operation cost by total output units.
Single or Output Costing	Cost is ascertained for a product, the product being the only one produce like bricks, coals, etc.
Multiple or Composite Costing	It represents a combination of two or more methods of costing outlined above. For example, if a firm manufactures bicycles including its components; the parts will be costed by batch costing system but the cost of assembling the bicycle will be computed by the single or output costing method. The whole system of costing is known as multiple costing. It is generally applied in cars, scooter, refrigerators etc.
Techniques of Costing	• **Uniform Costing –** When a number of firms in an industry agree among themselves to follow the same system of costing in details, adopting common terminology for various items and processes they are said to follow a system of uniform costing. • **Marginal Costing –** It is defined as the ascertainment of marginal cost by differentiating between fixed and variable costs. • **Standard Costing and Variance Analysis –** It is the technique whereby standard costs are pre-determined and subsequently compared with the actual costs. • **Historical Costing –** It is the ascertainment of costs after they have been incurred. • **Absorption Costing –** It is the practice of charging all costs, both variable and fixed to operations, process or products. This differs from marginal costing where fixed costs are excluded.

Industry	Method of costing	Cost Unit
Bricks	Single or Output Costing	Per 1,000 bricks
Coal	Single or Output Costing	Per ton
Road Construction	Job Costing	Per kilometer or per mile
Advertising	Job Costing	Each job
Interior Decoration	Job Costing	Each job
Made to Order	Job Costing	Number
Readymade Garments	Batch Costing	Number
Tyres and Tubes	Batch Costing	Each batch
Toys	Batch Costing	Each batch
Pharmaceuticals	Batch Costing	1000nos., tablets, strips
Water Supply	Operating Costing	Per 1,000 litre
Bus Cervice	Operating Costing	Per passenger kilometer
Education	Operating Costing	Per student hour
Electricity	Operating Costing	Per kilowatt hour
Goods Transport	Operating Costing	Per ton mile or per ton kilometer
Taxi	Operating Costing	Per km
Airline	Operating Costing	Per passenger per one way trip
Hospital	Operating Costing	Per patient day/per out-patient
Hotel	Operating Costing	Per room per day/per meal
Bridge Construction	Contract Costing	Each contract
Ship Building	Contract Costing	Each ship
Cement	Process Costing	Per ton or per bag
Mining	Process Costing	Per ton
Petrochemicals	Process Costing	Per tons, gallons litres
Steel	Process Costing	Per ton
Textiles	Process Costing	Per meter
Sugar	Process Costing	Per ton
Paper	Process Costing	Per kg./ton
Fertilizer	Process Costing	Per ton
Oil refinery	Process Costing	Per gallon

Industry	Method of costing	Cost Unit
Automobile	Multiple Costing	Number
Furniture	Multiple Costing	Number
Bicycle Manufacturing	Multiple Costing	Number

Industry Sector	Cost Unit
Brewing	Barrel
Brick-making	1,000 Bricks
Coal mining	Tonne/ton
Electricity	Kilowatt-hour (kWh)
Engineering	Contract, Job
Oil	Barrel, tonne, litre
Hotel/Catering	Room/meal
Professional services	Chargeable hour, job, contract
Education	Course, enrolled students, successful students
Hospitals	Patient day
Credit Control	Accounts maintained
Selling	Customer call, value of sales, orders taken
Material storage/handling	Requisition unit issued/received, material movement, value issued/received
Personnel administration	Personnel record

2

CHAPTER

Cost Sheet

Direct Material	• Materials which are present in the finished product or can be identified in the product are called direct materials. • For example, cloth in dress making, materials purchased for a specific job etc.
Indirect Material	• It indicates that material which cannot be identified with the individual cost centre. • For example, consumables stores, cotton waste, oils and lubricants, stationery material etc.
Direct Labour	• Labour which can be identified or attributed wholly to a particular job, product or process or expended in converting raw materials into finished products is called direct labour. • For example, labour engaged on the actual production of the product etc. • Some of the elements to be included are as follows: ❍ Wages and salary ❍ Allowances and incentive ❍ Overtime ❍ Bonus or ex-gratia ❍ Employer's contribution to social security schemes ❍ Any other benefits in cash or in kind
Indirect Labour	• Labour costs which cannot be allocated but can be apportioned to or absorbed by cost units or cost centers is known as indirect labour. • Examples of indirect labour includes – wages paid to foreman/storekeeper, salary of works manager etc.
Direct Expenses	These are expenses other than direct material and direct labour. Few examples are: • Fee for technical assistance and know-how • Cost of utilities such as power & fuel, steam etc. • Hire charges paid for firing specific equipment • Royalty paid or payable for production or provision of service • Amortized cost of moulds, patterns, patents etc. • Cost for product or service specific design or drawing • Cost of product or service specific software • Other expenses which are directly related with the production of goods or provision of service

Indirect Expenses	• These are those expenses which cannot be identified with the individual cost centers. • For example, Factory rent and rates, insurance of plant and machinery, etc.
Overheads	• It is aggregate total of indirect material, indirect labour and indirect expenses.
Classification of Overheads	• **Factory overheads -** These overheads consist of all overhead costs incurred from the stage of procurement of material till the stage of production of finished goods e.g. depreciation on factory building, wages paid to foreman/ storekeeper, haulage, consumables, etc. • **Office and Administration Overheads -** These overheads consist of all overhead costs incurred for the overall administration of the organization. They include, office supplies, stationery items, directors remuneration, audit fees, bank charges, telephone expenses etc. • **Selling and Distribution Overheads -** These overheads consist of all costs incurred from the stage of final manufacturing of finished goods till the stage of sale of goods in the market and collection of dues from the customers e.g. cost of samples, packing material, commission paid to sales manager, warehouse charges, bad debts, advertisement etc.
Prime Costs	• The aggregate of direct material, direct labour and direct expenses is called prime cost.
Quality Control Costs	• It is the cost incurred to minimize or avoid the number of defects. • E.g. workers training, quality engineering cost etc.
Research & Development Cost	• It is the cost related to improvement of process, system or services are included in the cost of manufacturing or service.
Credit for Recoveries	• It is the realized or realizable value or scrap or waste. • It is deducted while computing cost of production.
Primary Packaging	• It is the cost required to be incurred for packing without which it can't be sold to the consumer.
Secondary Packaging	• It is the cost required to be incurred that helps in storage, transportation and otherwise making the product marketable.
Cost of Production	• It is the sum total of prime cost and factory related costs and overheads. • It also includes quality control costs, research & development cost (process related), administrative overheads related to production, primary packing cost and credit for recoveries.
Cost of Goods Sold	• It is the cost of production for goods sold. It is computed after adjusting opening stock and closing stock of finished goods.
Cost of Sales	• It is the cost incurred to make the product available to the customer or consumer. • It is the sum total of cost of goods sold, selling overheads, distribution overheads, administrative overheads (general) and secondary packing expenses.

Cost Sheet	• **Cost Sheet –** It is a statement which shows the break-up and build-up of costs. It is a document which provides for the assembly of the detailed cost of a cost center or a cost unit.
Uses of Cost Sheet	• Presentation of cost information • Determination of selling price • Ascertainment of profitability • Product-wise and location-wise cost analysis • Inter-firm and Intra-firm cost comparison • Preparation of cost estimates for submitting tenders/quotations • Preparation of budgets • Disclosure of operational efficiency for cost control.
Advantages of Cost Sheet	• It provides total cost as well as cost per unit of production or service. • It helps in cost estimation for tenders and other purposes. • It helps in determination of selling price. • It provides data for cost control. • It helps in cost comparison
Difference between Production Account and Cost Sheet	(a) Production Account is based on double entry system whereas Cost Sheet is not based on double entry system. (b) Production Account consists of two parts. The first part shows cost of the components and total production cost. The second part shows the cost of sales and profit for the period. Cost Sheet presents the elements of costs in a classified manner and the cost is ascertained at different stages such as prime cost: works cost; cost of production; cost of goods sold; cost of sales and total cost. (c) Production Account shows the cost in aggregate and thus facilitates comparison with other financial accounts. Cost Sheet shows the cost in detail and analytical manner, which facilitate comparison of cost for the purpose of cost control. (d) Production Account is not useful for preparing tenders or quotations. Estimated cost sheets can be prepared on the basis of actual cost sheets and these are useful for preparing tenders or quotations.
Treatment of Audit Fee	• It is just like any other normal item of expense and it is included as an expense in the cost accounts and financial accounts. • In both the accounts, it may be included as an expense on accrual basis • This expense is part of the administration overheads and absorbed or charged to the product cost at some or the other pre-determined rate.
Treatment of Holiday with Pay	• Every worker is entitled to certain number of holiday during the year for which he is paid. • Holiday with pay is estimated in advance for the full year and is included in the cost. • For direct workers holiday with pay may be treated as a direct cost by inflating the wage-rate. • For all indirect workers, holiday with pay is treated as an overhead.

Treatment of Casual Wages	• It means wages payable to casual workers. • Casual workers are those workers who are employed on daily basis and are not on the regular payroll of the employer. • Casual workers are mostly untrained and indirect workers. Their wages therefore become a part of production overhead.
Treatment of Notional Rent of Factory Building	• It is a reasonable charge raised in the cost accounts for the use of owned premises. • One reason for the use of such a nominal charge is to enable comparison between the cost of items made in factories which are owned and in rented factories. • However, it may be noted that the case of owned factory cost for the same is accounted for by means of depreciation.
Treatment of Research and Development Expenses	• Research and development cost is the cost/expense incurred for searching new or improved products, production methods/techniques or plants/ equipment. • Research Cost may be incurred for carrying basic or applied research. • Cost of Basic Research (if it is a continuous activity) shall be charged to the revenues of the concern. • Cost of applied research, if relates to all existing products and methods of production then it should be treated as a manufacturing overhead of the period during which it has been incurred and absorbed. • If applied research is conducted for searching new products or methods of production etc., then the research costs treatment depends upon the outcome of such research. • If research proves successful, then such costs will be charged to the concerned product. • If it appears unsuccessful then the costs incurred may be amortized by charging to the Costing P&L Account of one or more years depending upon the size of expenditure.
Treatment of Fringe Benefits	• In every organization, workers are paid some benefits in additional to their normal wage or salary known as fringe benefits like children education allowance, holiday pay etc. • Expenses incurred on factory workers should be treated as factory overheads and recovered accordingly. • Fringe benefits to office and selling and distribution staff be treated as administration overheads and selling and distribution overheads respectively and recovered accordingly.
Treatment of Bad Debts	• Some authors believe that bad debts are financial losses and therefore should not be included in the cost of a particulars product or job. • Another view is that, bad debts are a part of selling and distribution overheads, especially where they arise in the normal course of trading. Therefore they should be treated in cost accounts in the same way as any other selling and distribution expenses.

Treatment of Training Costs	• These costs comprises of wages and salaries of the trainees or learners, payments of fees etc. for training, occurring while providing training facilities to the new recruits. • Usually there is a service cost center, known as the training sections, to which all the training costs are allocated. • The total cost of training section is thereafter apportioned to production centers.
Treatment of Packing Expenses	• Primary packing is a part of the production cost e.g., packing of chemicals and medicines etc. and should be included in the production cost of the product. • Secondary packing is a part of the selling and distribution cost. It is required while selling/transferring the product and for its safe delivery to the customer. Such expenses are charged to selling and distribution overheads
Treatment of Expenses on Removal and re-erection of Machinery	• Such expenses may be incurred due to factors like change in the method of production an addition or alteration in the factory building, change in the flow of production, etc. • All such expenses are treated as production overheads. When amount of such expenses is large, it may be spread over a period of time. • If such expenses are incurred due to faulty planning or some other abnormal factor, then they may be charged to Cost Profit and Loss Account.
Treatment of Employee Welfare Cost	• It includes those expenses, which are incurred by the employers on the welfare activities of their employees e.g., expenses on canteen, hospital, etc. • These expenses should be separately recorded as Welfare Department Costs. These Costs may be apportioned to production cost centres on the basis of total wages or the number of men employed by them.
Treatment of Small Tools	• Small tools are mechanical appliances used for various operations on a work place e.g. screw, drill bits, hammer etc. • They may be capitalized and depreciated over life if their life is ascertainable. Deprecation may be charged to factory overheads or overheads of department using small tools. • If their life is not ascertainable then to be charged fully to the department to which they have been issued.
Treatment of Carriage Inwards Material	• It represents the expenditure incurred in bringing raw materials to factory from outside. • This expense is directly allocated to materials and thus forms a part of the cost of such materials. • When this is not practicable and allocation to specific items of materials is difficult, the expense is treated as manufacturing overhead and is charged to cost of production at a predetermined rate.
Treatment of Storage Losses	• Losses due to reasons like evaporation, shrinkage, etc. are considered as normal losses. Such losses are absorbed by good production units by inflating the cost of material issued for production. • Losses due to fire, flood, storm, theft etc. are treated as abnormal losses. If these losses are heavy and are not recoverable from the insurance authorities, it is preferred to charge them to Costing Profit and Loss Account.

Treatment of Insurance Costs on Stock of Raw Materials	• The amount paid as insurance costs on stocks of raw materials is meant for covering the risk which may arise due to fire, theft, riot etc. • The insurance cost is apportioned over different materials on the basis of their value. • This cost may be charged direct to the cost of material.
Treatment of Stores Overheads	• It include all those expenses (excluding material costs) which are incurred by stores department to perform its function such as purchase, storage etc. e.g. rent, insurance etc. • They are treated as a part of factory overheads and are charged to various production and non-production departments on the basis of service received by each department. • It can be recovered using number of stores requisition, value of material etc.
Treatment of Interest on Capital	• It includes any payment in nature of interest for use of non-equity fund and incidental cost that an entity incurs in arranging those funds. • For example, interest and financing charges are interest on borrowings, financing charges in respect of finance leases, cash discount allowed to customers. • It will be presented in the cost statement as a separate item of cost of sales.
Subsidy or Grant or Incentive	• Any subsidy/grant/incentive received from the government or from other sources should be deducted from the cost of purchase.
GST	• GST is paid on inter-state and intra-state sale and collected from the buyers. • It is excluded from the cost of purchase if credit for the same is available. • Unless mentioned specifically it should not form part of cost of purchase.
Commission or Brokerage	• Commission or brokerage paid is added with the cost of purchase.

PRACTICE QUESTIONS

1. The following figures are extracted from the Trial Balance of SK & Co. on 30th September: [SM]

	Amount (₹)
Inventories: Finished Stock	80,000
Raw Materials	1,40,000
Work in progress	2,00,000
Office Appliances	17,400
Plant & Machinery	4,60,500
Buildings	2,00,000
Sales	7,68,000
Sales return and Rebates	14,000
Material Purchased	3,20,000
Freight incurred on materials	16,000
Purchase return	4,800
Direct Labour	1,60,000
Indirect Labour	18,000
Factory supervision	10,000
Repairs and upkeep – factory	14,000
Heat, Light and Power	65,000
Rates and Taxes	6,300
Miscellaneous Factory Expenses	18,700
Sales commission	33,600
Sales Travelling	11,000
Sales Promotion	22,500
Distribution Dept. salaries and expenses	18,000
Office salaries and expenses	8,600
Interest on Borrowed Funds	2,000
Further details are available as follows:	
(i) Closing Inventories: Finished Goods	1,15,000
Raw Goods	1,80,000
Work in progress	1,92,000
(ii) Accrued expenses on: Direct Labour	8,000
Indirect Labour	1,200
Interest on borrowed funds	2,000

(iii) Depreciation to be provided on:
Office Appliances – 5%
Plant & Machinery – 10%
Building – 4%

(iv) Distribution of the following costs:
Heat, Light and Power to Factory, Office and Distribution in the ratio 8:1:1
Rates and Taxes two-thirds to Factory and one-third to office
Depreciation on Buildings to factory, office and Distribution in the ratio 8:1:1

With the help of the above information, you are required to prepare:
(i) statement of cost showing various elements of cost and
(ii) statement of profit

Ans. (i) ₹7,14,020; (ii) ₹35,980.

2. The books of SK Ltd. presents the following data for the month of March:
[SM, Similar to Jan 2021, Similar to Nov 2018]

Direct labour cost ₹17,500 being 175% of works overheads
Cost of goods sold excluding administrative expenses ₹56,000
Inventory accounts showed the following opening and closing balances:

	March 1 (₹)	March 31 (₹)
Raw materials	8,000	10,600
Work-in-progress	10,500	14,500
Finished goods	17,600	19,000

Other data are:

Selling expenses	₹3,500
General and administration expenses	₹2,500
Sales for the month	₹75,000

You are required to:
(a) Calculate the value of materials purchased
(b) Prepare a cost statement showing the various elements of cost and also the profit earned.

Ans. (a) ₹36,500; (b) COS = ₹62,000; Profit = ₹13,000.

3. SK ltd. has the following expenditures for the year ended 31st December: **(RTP May 2024)**

Particulars	Amount (₹)	Amount (₹)
Raw material purchased		5,00,00,000
Freight inward		9,20,600
Wages paid to factory workers		25,20,000
Royalty paid for production		1,80,000
Amount paid for power & fuel		3,50,000
Job charges paid to job worders		3,10,000
Stores and spares consumed		1,10,000
Depreciation on office building		50,000

Particulars	Amount (₹)	Amount (₹)
Repairs & maintenance paid for:		
- Plant & Machinery	40,000	
- Sales office building	20,000	60,000
Insurance premium paid for:		
- Plant & Machinery	28,200	
- Factory building	18,800	47,000
Expenses paid for quality control check		18,000
Research & Development cost paid for improvement in production process		20,000
Expenses paid for pollution control and engineering & maintenance		36,000
Salary paid to Sales & marketing managers		5,60,000
Salary paid to General Manager		6,40,000
Packing cost paid for:		
- Primary packing necessary to maintain quality	46,000	
- For re-distribution of finished goods	80,000	1,26,000
Fee paid to independent directors		1,20,000
Performance bonus paid to sales staffs		1,20,000
Value of stock as on 1st April of last year:		
- Raw materials	10,00,000	
- Work-in-process	8,60,000	
- Finished goods	12,00,000	30,60,000
Value of stock as on 31st March of current year:		
- Raw materials	8,40,000	
- Work-in-process	6,60,000	
- Finished goods	10,50,000	25,50,000

Amount realized by selling of scrap and waste generated during manufacturing process - ₹48,000. From the above data you are requested to prepare statement of cost for SK ltd. for the year ended 31st March, showing (i) Prime cost, (ii) Factory cost, (iii) Cost of production, (iv) Cost of goods sold and (v) Cost of sales.

Ans. (i) ₹5,44,40,600; (ii) ₹5,48,73,600; (iii) 5,49,09,600; (iv) ₹5,50,59,600; (v) ₹5,66,49,600.

4. SK ltd. has the following expenditures for the year ended 31st March: **[SM]**

Particulars	Amount (₹)	Amount (₹)
Raw materials purchased		10,00,00,000
GST paid on the above purchases @18% (eligible for input tax credit)		1,80,00,000
Freight inwards		11,20,600

Particulars	Amount (₹)	Amount (₹)
Wages paid to factory workers		29,20,000
Contribution made towards employees' PF and ESI		3,60,000
Production bonus paid to factory workers		2,90,000
Royalty paid for production		1,72,600
Amount paid for power & fuel		4,62,000
Amount paid for purchase of moulds and patterns (life is equivalent to two years production)		8,96,000
Job charges paid to job workers		8,12,000
Stores and spares consumed		1,12,000
Depreciation on:		
Factory building	84,000	
Office building	56,000	
Plant & Machinery	1,26,000	
Delivery vehicles	86,000	3,52,000
Salary paid to supervisors		1,26,000
Repairs & maintenance paid for:		
Plant & Machinery	48,000	
Sales office building	18,000	
Vehicles used by directors	19,600	85,600
Insurance premium paid for:		
Plant & Machinery	31,200	
Factory building	18,100	
Stock of raw materials & WIP	36,000	85,300
Expenses paid for quality control check activities		19,600
Salary paid to quality control staffs		96,200
Research & development cost paid for improvement in production process		18.200
Expenses paid for pollution control and engineering & maintenance		26,600
Expenses paid for administration of factory work		1,18,600
Salary paid to functional managers:		
Production control	9,60,000	
Finance & accounts	9,18,000	
Sales & Marketing	10,12,000	28,90,000
Salary paid to General Manager		12,56,000
Packaging cost paid for:		
Primary packing necessary to maintain quality	96,000	
For re-distribution of finished goods	1,12,000	2,08,000

Particulars	Amount (₹)	Amount (₹)
Wages of employees engaged in distribution of goods		7,20,000
Fee paid to auditors		1,80,000
Fee paid to legal advisors		1,20,000
Fee paid to independent directors		2,20,000
Performance bonus paid to sales staff		1,80,000
Value of stock as on 1st April of last year		
Raw materials	18,00,000	
Work-in-process	9,20,000	
Finished goods	11,00,000	38,20,000
Value of stock as on 31st March of current year		
Raw materials	9,60,000	
Work-in-process	8,70,000	
Finished goods	18,00,000	36,30,000

Amount realized by selling of scrap and waste generated during manufacturing process is ₹86,000. From the above data you are required to prepare statement of cost for the year ended 31st March, showing (i) prime cost, (ii) factory cost, (iii) cost of production, (iv) cost of goods sold and (v) cost of sales.

Ans. (i) ₹10,74,25,200; (ii) ₹10,80,83,100; (iii) ₹10,93,05,700; (iv) ₹10,86,05,700; (v) ₹11,35,03,300.

5. SK Ltd. produces a single product X. During the month of July 2023, the company has produced 14,560 tonnes of X. The details for the month of July 2023 are as follows:

[RTP Nov 2023]

(i) Materials consumed ₹15,00,000
(ii) Power consumed in operating production machinery 13,000 Kwh @ ₹7 per Kwh
(iii) Diesels consumed in operating production machinery 1,000 litres @ ₹93 per litre
(iv) Wages & salary paid – ₹64,00,000
(v) Gratuity & leave encashment paid – ₹44,20,000
(vi) Hiring charges paid for Heavy Earth Moving machines (HEMM) engaged in production - ₹13,00,000. Hiring charges is paid on the basis of production.
(vii) Hiring charges paid for cars used for official purpose – ₹80,000
(viii) Reimbursement of diesel cost for the cars – ₹20,000
(ix) The hiring of cars attracts GST under RCM @5% without credit.
(x) Maintenance cost paid for weighing bridge (used for weighing of final goods at the time of dispatch) – ₹7,000
(xi) AMC cost of CCTV installed at weighing bridge (used for weighing of final goods at the time of dispatch) and factory premises is ₹6,000 and ₹18,000 per month respectively.
(xii) TA/ DA and hotel bill paid for sales manager- ₹16,000

The company has 180 employees works for 26 days in a month.

Required to prepare a Cost sheet for the month of July 2023.

Ans. Prime cost - ₹1,38,04,000; COS = ₹1,39,56,000

6. A fire occurred in the factory premises on October 31. The accounting records have been destroyed. Certain accounting records were kept in another building. They reveal the following for the period September 1 to October 31:

(a)	Direct materials purchased	₹2,50,000
(b)	Work in progress inventory (1 Sep)	₹40,000
(c)	Direct material inventory (1 Sep)	₹20,000
(d)	Finished goods inventory (1 Sep)	₹37,750
(e)	Indirect manufacturing costs	40% of conversion cost
(f)	Sales revenue	₹7,50,000
(g)	Direct Manufacturing labour	₹2,22,250
(h)	Prime costs	₹3,97,750
(i)	Gross margin percentage based on revenues	30%
(j)	Cost of goods available for sale	₹5,55,775

The cost is fully covered by insurance. The insurance company wants to know the historical cost of the inventories as the basis for negotiating a settlement, although the settlement is actually to be based on replacement cost, not historical cost.

Required:

(a) Finished goods inventory 31 October

(b) Work in process inventory 31 October

(c) Direct material inventory 31 October

Ans. (a) ₹30,775; (b) ₹67,892; (c) ₹94,500.

7. Prepare a cost sheet to show the total cost of production and cost per unit of goods manufactured by a company for the month of August. Also, find the cost of sales.

	₹		₹
Stock of raw material 1-08	3,000	Factory rent and rates	3,000
Raw material purchased	28,000	Office Rent	500
Stock of raw material 31-08	4,500	General Expenses	400
Manufacturing wages	7,000	Discount on sales	300
Depreciation on plant	1,500	Advertisement exp. to be charged fully	600
Loss on sale of part of plant	300	Income tax paid	2,000

The number of units produced during August was 3,000. The stock of finished goods was 200 and 400 units on 1-08 and 31-08 respectively. The total cost of units on hand on 1-08 was ₹2,800. All these had been sold during the month.

Ans. COP = ₹38,000; Cost per unit manufactured = ₹12.67; COS = ₹37,533.

8. The following data relates to manufacturing of a standard product during the month of the March, 2021: **[July 2021]**

Particulars	Amount (in ₹)
Stock of Raw material as on 01-03-2021	80,000

Work in progress as on 01-03-2021	50,000
Purchase of raw material	2,00,000
Carriage inwards	20,000
Direct wages	1,20,000
Cost of special drawing	30,000
Hire charges paid for Plant	24,000
Return of Raw Material	40,000
Carriage on return	6,000
Expenses for participation in Industrial exhibition	8,000
Legal charges	2,500
Salary to office staff	25,000
Maintenance of office building	2,000
Depreciation on Delivery Van	6,000
Warehousing charges	1,500
Stock of Raw material as on 31-03-2021	30,000
Stock of Work in Progress as on 31-03-2021	24,000

Store overheads on material are 10% of material consumed.

- Factory overheads are 20% of the prime cost
- 10% of the output was rejected and a sum of `5,000 was realized on sale of scrap.
- 10% of the finished product was found to be defective and the defective products were rectified at an additional expenditure which is equivalent to 20% of proportionate direct wages.
- The total output was 8,000 units during the month.

You are required to prepare a cost sheet for the above period showing the:

(i) Cost of raw material consumed
(ii) Prime cost
(iii) Work cost
(iv) Cost of production
(v) Cost of sales

Ans. (i) ₹2,30,000; (ii) ₹4,04,000; (iii) ₹5,41,960; (iv) ₹5,36,960; (v) ₹5,81,960.

9. Following costs were incurred in producing 800 MT of Rods:

Materials	₹2,80,000
Labour	₹1,00,000
Processing Charges	₹1,00,000
Total costs	₹4,80,000

Of the total output, 10% was defective and had to be sold at a discount of 10% of the normal price. The scrap arising out of the production realized a sum of ₹8,760. The sale price is calculated to yield 15% profit on sales. You are required to find out the normal price as well as the discounted price of per MT of Rode.

Ans. Normal price = ₹700; Discounted price = ₹630.

10. The managing director of a company seeks your assistance in the matter of fixation of selling price for one of its products called S. The cost structure of product S, the unit selling price of which is ₹45,000 is as under;

Direct Material	50%
Direct Labour	20%
Overhead	30%

An increase of 15% in the cost of material and 25% in the cost of labour is anticipated. These increased costs in relation to the present selling price would cause a 25% decrease in the amount of present profit per unit of S.

You are required to:

(a) Prepare a statement of profit per unit as at present and

(b) Find out the revised selling price to produce the same percentage of profit to sales as before.

Ans. (a) ₹15,000; (b) ₹50,625.

11. In a manufacturing company, factory overheads are charged as fixed percentage basis on direct labour and office overheads are charged on the basis of percentage of factory cost. The following information are available related to the year ending 31st March:

	Product A	Product B
Direct materials	₹19,000	₹15,000
Direct Labour	₹15,000	₹25,000
Sales	₹60,000	₹80,000
Profit	25% on cost	25% on sales price

You are required to find out:

(a) The percentage of factory overheads on direct labour

(b) The percentage of office overheads on factory cost

Ans. (a) 40%; (b) 20%.

12. SK Ltd. engaged in job work, has completed all jobs in hand on 29 November, except Job No. 415. The cost sheet on 29 November showed direct material and direct labour costs of ₹40,000 and ₹30,000, respectively, as having been incurred on Job No. 415.

The costs incurred by the business on 30 November the last day of the month, were as follows:

Direct materials (Job 415)	₹2,000
Direct labour (Job 415)	₹8,000
Indirect labour	₹2,000
Miscellaneous factory overheads	₹3,000

It is the practice of the business to make the jobs absorb factory overheads on the basis of 120% of direct labour cost. Calculate the cost of work-in-progress of Job No. 415 as on 30th November.

Ans. ₹1,25,600.

13. The following figures are available from the books of SK Co. for the year 31st March:

	₹		₹
Materials:		Profit for the year	12,180
Stock on 1st April	2,000	Selling overhead	10,500
Stock on 31st March	4,000	Factory overhead	9,000
Purchases	20,000	Administration overhead	8,400
Wages	15,000		

(a) Prepare a cost sheet showing prime cost, work cost, cost of production, cost of sales and sales.

(b) In April, the factory receives an order for a job which will require materials ₹2,400 and wages ₹1,500. Ascertain the sale price of the job if the factory intends to earn a profit 10% higher than the percentage of profit earned in year ending on 31st March. Assume that the factory overhead has gone up by 16(2/3)% and selling overhead has gone down by 20% after 31st March. Further assume that factory overhead is recovered as a percentage of the wages and administration and selling overhead as a percentage of works cost.

Ans. (a) Sales = ₹73,080; (b) Sale price = ₹8,455.

14. SK Ltd. provides you the following figures for the year 2022-23:

Direct Material	₹3,20,000
Direct wages	₹8,00,000
Production overheads (25% variable)	₹4,80,000
Administration overheads (75% fixed)	₹1,60,000
Selling and Distribution overheads (2/3 fixed)	₹2,40,000
Sales @ ₹125 per unit	₹25,00,000

For the year 2023-24, it is estimated that:

(a) Output and sales quantity will increase by 20% by incurring additional advertisement expenses of ₹45,200

(b) Material prices will go up 10%

(c) Wage rate will go up by 5% alongwith, increase in overall direct labour efficiency by 12%

(d) Variable overheads will increase by 5%

(e) Fixed production overheads will increase by 33 1/3%.

Required:

(a) Calculate the cost of sales for the year 2022-23 and 2023-24

(b) Find out the selling price for the year 2023-24 if the existing percentage of profit is to be increased by 25%

Ans. (a) ₹20,00,000; ₹24,30,000; (b) ₹132.89.

15. A factory incurred the following expenditure during the year:

		₹
Direct material consumed		12,00,000
Manufacturing wages		7,00,000
Manufacturing overheads:		
Fixed	3,60,000	
Variable	2,50,000	6,10,000
		25,10,000

In the next year, following changes are expected in production and cost of production.

(a) Production will increase due to recruitment of 60% more workers in the factory.
(b) Overall efficiency will decline by 10% on account of recruitment of new workers.
(c) There will be an increase of 20% in fixed overhead and 60% in variable overhead.
(d) The cost of direct material will be decreased by 6%.
(e) The company desire to earn a profit of 10% on selling price.

Ascertain the cost of production and selling price.

Ans. COP = ₹37,52,320; Selling price = ₹41,69,244.

16. M/s Areeba Private Limited has a normal production capacity of 36,000 units of toys per annum. The estimated costs of production are as under: **[May 2019]**

(i) Direct Material ₹40 per unit
(ii) Direct Labour ₹30 per unit (subject to a minimum of ₹48,000 p.m.)
(iii) Factory Overheads:
  (a) Fixed ₹3,60,000 per annum
  (b) Variable ₹10 per unit
  (c) Semi-variable ₹1,08,000 per annum up to 50% capacity and additional ₹46,800 for every 20% increase in capacity or any part thereof
(iv) Administrative Overheads ₹5,18,400 per annum (fixed)
(v) Selling overheads are incurred at ₹8 per unit
(vi) Each unit of raw material yields scrap which is sold at the rate of ₹5 per unit
(vii) In year 2019, the factory worked at 50% capacity for the first three months but it was expected that if would work at 80% capacity for the remaining nine months.
(viii) During the first three months, the selling price per unit was ₹145

You are required to:

(i) Prepare a cost sheet showing Prime Cost, Works Cost, Cost of Production and Cost of sales
(ii) Calculate the selling price per unit for remaining nine months to achieve the total annual profit of ₹8,76,600.

Ans. (i) COS = ₹6,29,100; ₹26,02,800; (ii) ₹160.

17. XYZ a manufacturing firm, has revealed following information for September, 2019:

[Nov – 2019]

	1st September	30th September
	₹	₹
Raw Materials	2,42,000	2,92,000
Works-in-progress	2,00,000	5,00,000

The firm incurred following expenses for a targeted production of 1,00,000 units during the month:

	₹
Consumable Stores and spares of factory	3,50,000
Research and development cost for process improvements	2,50,000
Quality control cost	2,00,000
Packing cost (secondary) per unit of goods sold	2
Lease rent of production asset	2,00,000
Administrative Expenses (General)	2,24,000
Selling and distribution Expenses	4,13,000
Finished goods (opening)	Nil
Finished goods (closing)	5,000 units

Defective output which is 4% of targeted production, realizes ₹61 per unit. Closing stock is valued at cost of production (excluding administrative expenses). Cost of goods sold, excluding administrative expenses amounts to ₹78,26,000. Direct employees' cost is ½ of cost of material consumed. Selling price of the output is ₹110 per unit.

You are required to:

(i) Calculate the value of material purchased

(ii) Prepare cost sheet showing the profit earned by the firm

Ans. (i) ₹52,50,000; (ii) 13,65,000.

18. SK ltd. has capacity to produce 1,00,000 units of product every month. Its work cost at varying level of production is as under: **[SM, MTP – Nov 2020]**

Level	Work Cost per unit
10%	400
20%	390
30%	380
40%	370
50%	360
60%	350
70%	340
80%	330
90%	320
100%	310

Its fixed administration expenses amount to ₹1,50,000 and fixed marketing expenses amount to ₹2,50,000 per month respectively. The variable distribution cost amount to ₹30 per unit.

It can market 100% of its output at ₹500 per unit provided it incurs the following further expenditure:

(a) It gives gift items costing ₹30 per unit sale;

(b) It has lucky draws every month giving the 1st prize of ₹50,000, 2nd prize of ₹25,000, 3rd prize of ₹10,000 and three consolation prizes of ₹5,000 each to customers buying the product.

(c) It spends ₹1,00,000 on refreshments served every month to its customers;

(d) It sponsors a television programme every week at a cost of ₹20,00,000 per month

It can market 30% of its output at ₹550 per unit without incurring any of the expenses referred to in (a) to (d) above. Advise the company on its course of action.

Ans. Profit at 30% level = ₹38,00,000; Profit at 100% level = ₹1,04,00,000.

19. SK Company manufactures X and Y in one standard size of tin retailing at ₹12.00 and ₹13.30 respectively. Following information is supplied to you:

Opening stock:

X	2,400 tins
Y	8,000 tins

Closing Stock:

X	5,400 tins
Y	3,000 tins

Sales:

X	72,000 tins
Y	30,000 tins

Direct materials:

A	₹2,46,000
B	₹1,20,000

Direct wages	₹2,04,000	
Production overhead		₹3,06,000
Administration and selling overhead		₹1,02,000

The opening stock of X and Y was valued at its production cost. The cost of raw materials 'A' for Y is 10 per cent higher than that for X, but there is no difference in the cost of material B. Direct wages for Y are 8 per cent higher than those of X and production overheads are considered to vary with direct wages. Administration and selling overhead is absorbed at a uniform rate of per unit sold. Prepare a statement to show the cost and profit per unit.

Ans. Product X – cost = ₹9.60; profit = ₹2.40; Product Y – cost = ₹10.24; profit = ₹3.06

PRACTICE QUESTIONS

20. Calculate (a) Cost of raw-materials consumed; (b) Total cost of production; (c) Cost of goods sold and (d) The amount of profit from the following particulars:

	Amount (₹)
Opening Stock : Raw-materials	5,000
Finished Goods	4,000
Closing Stock : Raw-materials	4,000
Finished goods	5,000
Raw-materials purchased	50,000
Wages paid to labourers	20,000
Chargeable Expenses	2,000
Rent, Rates and taxes	5,000
Power	2,400
Factory heating and lighting	2,000
Factory insurance	1,000
Experimental expenses	500
Sale of wastage	200
Office management salaries	4,000
Office printing and stationery	200
Salaries of salesman	2,000
Commission of travelling agents	1,000
Sales	**1,00,000**

Ans. (a) ₹51,000; (b) ₹83,700; (c) ₹82,700; (d) 10,100.

21. Find profit by drawing a cost sheet with the following information for the month of June:

	Amount (₹)
Opening Stock : Raw materials	1350
Finished goods	2500
Closing Stock : Raw materials	750
Finished goods	1500
Raw material purchased	20000
Wages paid to labourers	8000
Direct Expenses	1250
Experimental expenses	450
Factory printing and stationery	350
Rent – Factory – 250	
Office – 120	370
Wages for supervisor	1000
Interest paid	1200
Dividend received	300
Lighting – Office	125
Audit fees	150
Bank Charges	500
Cost of samples	100
Income tax	1000

Telephone expenses	600
Advertising	1250
Cash discount	800
Market research expenses	550
Salary of godown-keepers	175
Travelling expenses	750
Commission of travelling agents	500
Sales	**50000**

Ans. Profit = ₹12,280; Net profit = ₹11,080.

22. The following information has been obtained from the records of SK Ltd. for the period from April 1 to April 30, 2022. **[SM]**

	On April 1, 2022 (₹)	On April 30, 2022 (₹)
Cost of raw materials	60,000	50,000
Cost of work-in-process	12,000	15,000
Cost of stock of finished goods	90,000	1,10,000
Purchases of raw materials during April 2022		4,80,000
Wages paid		2,40,000
Factory overheads		1,00,000
Administration overheads (related to production)		50,000
Selling & distribution overheads		25,000
Sales		10,00,000

Prepare a statement giving the following information:

(a) Raw material consumed
(b) Prime cost
(c) Factory cost
(d) Cost of goods sold and
(e) Net profit

Ans. (a) ₹4,90,000; (b) ₹7,30,000; (c) ₹8,27,000; (d) ₹8,57,000; (e) ₹1,18,000.

23. The following details are available from the books of SK Ltd. For the year ending 31st March:

[RTP-Nov 2020]

Particulars	Amount (₹)
Purchase of raw materials	84,00,000
Consumable materials	4,80,000
Direct wages	60,00,000
Carriage inward	1,72,600
Wages to foreman and store keeper	8,40,000
Other indirect wages to factory staffs	1,35,000

Expenditure on research and development on new production technology	9,60,000
Salary to accountants	7,20,000
Employer's contribution to EPF & ESI	7,20,000
Cost of power & fuel	28,00,000
Production planning office expenses	12,60,000
Salary to delivery staffs	14,30,000
Income tax for the assessment year	2,80,000
Fees to statutory auditor	1,80,000
Fees to cost auditor	80,000
Fees to independent directors	9,40,000
Donation to PM-national relief fund	1,10,000
Value of sales	2,82,60,000
Position of inventories as on 01-04 of last year:	
- Raw material	6,20,000
- WIP	7,84,000
- Finished goods	14,40,000
Position of inventories as on 31-03 of current year:	
- Raw Material	4,60,000
- WIP	6,64,000
- Finished goods	9,80,000

From the above information prepare a cost sheet for the year ended 31st March.

Ans. COP = ₹2,20,47,600; COS = ₹2,58,57,600; Profit = ₹24,02,400.

24. The following particulars relating to the year have been taken from the books of a company:

Stock on 1st January:	**Kg**	₹
Raw materials	2,000	2,000
Finished mixture	500	1,750
Factory stores		7,250
Purchases:		
Raw materials	1,60,000	1,80,000
Factory stores		24,250
Sales:		
Finished mixture	1,53,050	9,18,000
Factory Scrap		8,170
Factory wages		1,78,650
Power		30,400
Depreciation on machinery		18,000
Salaries:		
Factory		72,220

Office		37,220
Selling		41,500
Expenses:		
Direct		18,500
Office		18,200
Selling		18,000
Stock on 31st December:		
Raw materials	1,200	?
Finished mixture	450	?
Factory stores		5,550

The stock of finished mixture at the end of the year is to be valued at the factory cost of the mixture for that year. The purchase price of raw materials remained unchanged throughout the year. Prepare a statement giving the maximum possible information about cost and its break-up for the year.

Ans. COP = ₹5,16,200; COGS = ₹5,16,408; COS = ₹6,31,328; Profit = ₹2,86672.

25. Following information relate to a manufacturing concern for the year ended 31st March, 2018:

	₹
Raw Material (opening)	2,28,000
Raw Material (closing)	3,05,000
Purchases of Raw Material	42,25,000
Freight Inwards	1,00,000
Direct wages paid	12,56,000
Direct wages-outstanding at the end of the year	1,50,000
Factory overheads	20% of prime cost
Work-in-progress (opening)	1,92,500
Work-in-progress (closing)	1,40,700
Administrative Overheads (related to production)	1,73,000
Distribution Expenses	₹16 per unit
Finished Stock (opening) – 1217 Units	6,08,500
Sale of scrap of material	8,000

The firm produced 14,000 units of output during the year. The stock of finished goods at the end of the year is valued at cost of production. The firm sold 14,153 units at a price of ₹618 per unit during the year. Prepare cost sheet of the firm.

Ans. COP = ₹70,00,000; Profit = ₹14,43,606.

26. The following data are available from the books and records of A Ltd. for the month of April 2022:

[May – 2022]

Particulars	Amount (₹)
Stock of raw materials on 1st April 2022	10,000
Raw material purchased	2,80,000
Manufacturing wages	70,000

Depreciation on plant	15,000
Expenses paid for quality control check activities	4,000
Lease rent of production assets	10,000
Administrative overheads (Production)	15,000
Expenses paid for pollution control and engineering & maintenance	1,000
Stock of raw materials on 30th April 2022	40,000
Primary packing cost	8,000
Research & development cost (Process related)	5,000
Packing cost for redistribution of finished goods	1,500
Advertisement expenses	1,300

Stock of finished goods as on 1st April 2022 was 200 units having a total cost of ₹28,000. The entire opening stock of finished goods has been sold during the month. Production during the month of April, 2022 was 3,000 units. Closing stock of finished goods as on 30th April, 2022 was 400 units.

You are required to:

(I) Prepare a cost sheet for the above period showing the:
- (i) Cost of raw material consumed
- (ii) Prime cost
- (iii) Factory cost
- (iv) Cost of production
- (v) Cost of goods sold
- (vi) Cost of sales

(II) Calculate selling price per unit, if sale is made at profit of 20% on sales.

Ans. (I) ₹2,50,000; ₹3,20,000; ₹3,46,000; ₹3,78,000; ₹3,55,600; ₹3,58,400; (II) ₹160.

27. The following data relates to the manufacture of a standard product during the month of April:

[SM]

Raw materials (₹)	1,80,000
Direct wages (₹)	90,000
Machine hours worked (hours)	10,000
Machine hour rate (per hour)	8
Administration overheads (general) (₹)	35,000
Selling overheads	₹5 per unit
Units produced	4,000
Units Sold	3,600
Selling price per unit (₹)	125

You are required to prepare a cost sheet in respect of the above, showing:
- (a) Cost per unit of goods produced
- (b) Profit for the month

Ans. (a) ₹87.50; (b) ₹82,000.

28. From the following particulars, you are required to prepare monthly cost sheet of SK Ltd.:

[SM]

	Amount (₹)
Opening Inventories	
- Raw materials	12,00,000
- Work-in-process	18,00,000
- Finished goods (10,000 units)	9,60,000
Closing inventories	
- Raw materials	14,00,000
- Work-in-process	16,04,000
- Finished goods	?
Raw material purchased	1,44,00,000
GST paid on raw materials purchased (ITC available)	7,20,000
Wages paid to production workers	36,64,000
Expenses paid for utilities	1,45,600
Office and administration expenses paid	26,52,000
Travelling allowance paid to office staffs	1,21,000
Selling expenses	6,46,000

Machine hours worked – 21,600 hours

Machine hour rate - ₹8.00 per hour

Units sold – 1,60,000

Units produced 1,94,000

Desired profit – 15% on sales

Ans. COP = ₹1,83,78,400; Profit = ₹32,80,461.

29. From the following data of Arnav Metallic Ltd., CALCUALTE cost of production:

[RTP May – 2018 & Nov – 2018]

		Amount (₹)
(i)	Repair & maintenance paid for plant & machinery	9,80,500
(ii)	Insurance premium paid for plant & machinery	96,000
(iii)	Raw material purchased	64,00,000
(iv)	Opening stock of raw materials	2,88,000
(v)	Closing stock of raw materials	4,46000
(vi)	Wages paid	23,20,000
(vii)	Value of opening Work-in-Progress	4,06,000
(viii)	Value of closing Work-in-Progress	6,02,100

		Amount (₹)
(ix)	Quality control cost for the products in manufacturing process	86,000
(x)	Research & development cost for improvement in production process	92,600
(xi)	Administrative cost for: - Factory & production - Others	 9,00,000 11,60,000
(xii)	Amount realized by selling scrap generated during the manufacturing process	9,200
(xiii)	Packing cost necessary to preserve the goods for further processing	10,200
(xiv)	Salary paid to director (Technical)	8,90,000

Ans. ₹1,05,22,000.

30. G Ltd. manufactures leather bags for office and school purpose. The following information is related with the production of leather bags for the month of September 2021:

[Dec – 21, RTP – Nov 2019]

(i) Leather sheets and cotton cloths are the main inputs, and the estimated requirement per bag is two meters of leather sheets and one meter of cotton cloth. 2,000 meter of leather sheets and 1,000 meter of cotton cloths are purchased at ₹3,20,000 and ₹15,000 respectively. Freight paid on purchases is ₹8,500.

(ii) Stitching and finishing need 2,000 man hours at ₹80 per hour.

(iii) Other direct cost of ₹10 per labour hour is incurred.

(iv) G Ltd. has 4 machines at a total cost of ₹22,00,000. Machine has a life of 10 years with a scrape value of 10% of the original cost. Depreciation is charged on straight line method.

(v) The monthly cost of administrative and sales office staffs are ₹45,000 and ₹72,000 respectively. G Ltd. pays ₹1,20,000 per month as rent for a 2,400 sq. feet factory premises. The administrative and sales office occupies 240 sq. feet and 200 sq. feet respectively of factory space.

(vi) Freight paid on delivery of finished bags is ₹18,000.

(vii) During the month 35 kg of leather and cotton cuttings are sold at ₹150 per kg.

(viii) There is no opening and closing stocks for input materials. There is 100 bags in stock at the end of the month.

You are required to prepare a cost sheet in respect of above for the month of September 2021 showing:

(a) Cost of raw material consumed

(b) Prime cost

(c) Works/Factory cost

(d) Cost of production

(e) Cost of goods sold

(f) Cost of sales

Ans. (a) ₹3,43,500; (b) ₹5,23,500; (c) ₹6,38,000; (d) ₹6,32,750; (e) ₹5,69,475; (f) ₹7,26,475.

31. From the following figures, calculate cost of production and profit for the month of March 2018:

[RTP – May 2018]

	Amount (₹)		Amount (₹)
Stock on 1st March, 2018		Purchase of raw materials	28,57,000
- Raw materials	6,06,000	Sale of finished goods	1,34,00,000
- Finished goods	3,59,000	Direct wages	37,50,000
Stock on 31st March, 2018		Factory expenses	21,25,000
- Raw materials	7,50,000	Office & Administration exp.	10,34,000
- Finished goods	3,09,000	Selling & Distribution exp.	7,50,000
Work-in-process:		Sale of scrap	26,000
- On 1st March, 2018	12,56,000		
- On 31st March, 2018	14,22,000		

Ans. COP = ₹83,96,000; Profit = ₹31,70,000.

32. PNME Ltd. manufactures two types of masks – 'disposal Masks' and 'Cloth Masks'. The cost data for the year ended 31st March, 2022 is as follows: **[Nov – 2022]**

	₹
Direct materials	12,50,000
Direct wages	7,00,000
Production Overhead	4,00,000
Total	23,50,000

It is further ascertained that:

- Direct material cost per unit of cloth Mask was twice as much of direct material cost per unit od disposal Mask
- Direct wages per unit for Disposal Mask were 60% of those for Cloth Mask
- Production overhead per unit was at same rate for both the types of the masks
- Administration overhead was 50% of Production overhead for each type of mask
- Selling cost was ₹2 per cloth mask
- Selling price was ₹35 per unit of cloth mask
- No. of units of cloth masks sold – 45,000
- No. of units of Production of
  - Cloth Masks : 50,000
  - Disposal Masks : 1,50,000

You are required to prepare a cost sheet for cloth masks showing:

(i) Cost per unit and total cost

(ii) Profit per unit and total cost

33. X Ltd. manufactures two types of pens 'Super Pen' and 'Normal Pen'. The cost data for the year ended 30th September, 2019 is as follows: **[Nov – 2020]**

	(₹)
Direct Materials	8,00,000
Direct Wages	4,48,000
Production Overhead	1,92,000
Total	14,40,000

It is further ascertained that:

(1) Direct materials cost in Super Pen was twice as much of direct material in Normal Pen.

(2) Direct wages for Normal Pen were 60% of those for super Pen.

(3) Production overhead per unit was at same rate for both the types.

(4) Administration overhead was 200% of direct labour for each.

(5) Selling cost was ₹1 per Super pen.

(6) Production and sales during the year were as follows:

Production		Sales	
	No. of units		**No. of units**
Super Pen	40,000	Super Pen	36,000
Normal Pen	1,20,000		

Selling price was ₹30 per unit for Super Pen.

Prepare a Cost Sheet for 'Super Pen' showing

(i) Cost per unit and Total Cost

(ii) Profit per unit and Total Profit

Ans. (i) ₹23.09; ₹8,31,200; (ii) ₹6.91; ₹2,48,800.

34. M Ltd. is producing a single product and may expand into product diversification in next one to two years. M Ltd. is amongst a labour-intensive company where majority of processes are done manually. Employee cost is a major cost element in the total cost of the company. The company conventionally uses performance parameters Earnings per manshift (EMS) to measure cost paid to an employee for a shift of 8 hours, and Output per manshift (OMS) to measure an employee's output in a shift of 8 hours. **[MTP May 2024]**

The Chief Manager (Finance) of the company has emailed you few information related to the last month. The email contains the following data related to the last month:

During the last month, the company has produced 2,34,000 tonnes of output. Expenditures for the last months are:

(i) Raw materials consumed ₹50,00,000

(ii) Power consumed 13,000 Kwh @ ₹8 per Kwh to run the machines for production.

(iii) Diesels consumed 2,000 litres @ ₹93 per litre to run power generator used as alternative or backup for power cuts.

(iv) Wages & salary paid – ₹6,40,00,000

(v) Gratuity & leave encashment paid – ₹64,20,000

(vi) Hiring charges paid for HEMM- ₹30,00,000. HEMM are directly used in production.

(vii) Hiring charges paid for cars used for official purpose – ₹66,000

(viii) Reimbursement of diesel cost for the cars – ₹22,000

(ix) The hiring of cars attracts GST under RCM @5% without credit.

(x) Maintenance cost paid for weighing bridge (used for weighing of final goods at the time of dispatch) – ₹12,000

(xi) AMC cost of CCTV installed at weighing bridge (used for weighing of final goods at the time of dispatch) and factory premises is ₹8,000 and ₹18,000 per month respectively.

(xii) TA/ DA and hotel bill paid for sales manager- ₹36,000

(xiii) The company has 1,800 employees works for 26 days in a month.

You are asked to calculate the followings:

(i) What is the amount of prime cost incurred during the last month:

(a) ₹7,54,20,000 (b) ₹7,57,10,000 (c) ₹7,56,06,000 (d) ₹7,87,10,000

(ii) What is the total and per shift cost of production for last month:

(a) ₹7,87,10,000 and ₹336.37 respectively

(b) ₹7,87,10,000 and ₹1,681.84 respectively

(c) ₹7,87,28,000 and ₹1,682.22 respectively

(d) ₹7,87,28,000 and ₹336.44 respectively

(iii) What is the value of administrative cost incurred during the last month:

(a) ₹92,400 (b) ₹88,000 (c) ₹1,48,400 (d) ₹1,44,000

(iv) What is the value of selling and distribution cost and total cost of sales:

(a) ₹36,000 & ₹7,88,76,400 respectively

(b) ₹56,000 & ₹7,88,76,400 respectively

(c) ₹36,000 & ₹7,88,72,000 respectively

(d) ₹56,000 & ₹7,88,72,000 respectively

(v) What is the value EMS and OMS for the last month:

(a) ₹1,504.70 & 5 tonnes respectively

(b) ₹1,367.52 & 5 tonnes respectively

(c) ₹1,504.70 & 4.37 tonnes respectively

(d) ₹1,367.52 & 4.37 tonnes respectively

Ans. (i) - (d), (ii) - (c), (iii) - (a), (iv) - (b), (v) - (a)

20.

Cost Sheet

Particulars			Amount (₹)
Opening stock of material			5,000
Add: Purchases of material			50,000
Less: Closing stock of material			(4,000)
		Raw material consumed	**51,000**
Add: Wages			20,000
Add: Direct Expenses			
Chargeable Expenses	2,000		
Power	2,400		4,400
		Prime Cost	**75,400**
Add: Factory overheads			
Rent, rates and taxes	5,000		
Heating & lighting	2,000		
Insurance	1,000		8,000
		GFC/NFC	**83,400**
Add: Experimental expenses			500
Less: Sale of wastage			(200)
		COP	83,700
Add: Opening stock of finished goods			4,000
Less: Closing stock of finished goods			(5,000)
		COGS	**82,700**
Add: Administrative overheads			
Office management salary	4,000		
Office printing and stationary	200		4,200
Add: Selling & Distribution overheads			
Salaries of salesman	2,000		
Commission to travelling agent	1,000		3,000
		Cost of sales	**89,900**
Add: Profit			10,100
		Sales	**1,00,000**

21.

Cost Sheet

Particulars		Amount (₹)
Opening stock of material		1,350
Add: Purchases of material		20,000
Less: Closing stock of material		(750)
	Raw material consumed	**20,600**
Add: Wages		8,000
Add: Direct expenses		1,200
	Prime Cost1	**29,850**
Add: Factory overheads		
Factory printing and stationary	350	
Rent	250	
Wages for supervisor	1,000	1,600
	GFC/NFC	**31,450**
Add: Experimental expenses		450
	COP	**31,900**
Add: Opening stock of finished goods		2,500
Less: Closing stock of finished goods		(1,500)
	COGS	**32,900**
Add: Administrative overheads		
Office rent	120	
Office lighting	125	
Audit fees	150	
Bank charges	500	
Telephone expenses	600	1,495
Add: Selling & Distribution overheads		
Cost of samples	100	
Advertising	1,250	
Market research expenses	550	
Salary of godown-keepers	175	
Travelling expenses	750	
Commission to travelling agent	500	3,325
	Cost of sales	**37,720**
Add: Profit		12,280
	Sales	**50,000**

Net profit = Profit – Interest = 12,280 – 1,200 = 11,080

22.

Statement of Cost & Profit
(for the month of June)

	(₹)
Opening stock of raw materials	60,000
Add: Purchase of raw materials during the month of June	4,80,000
Less Closing stock of raw materials	(50,000)
(a) Raw materials consumed	4,90,000
Add: Direct wages	2,40,000
(b) Prime cost	**7,30,000**
Add: Factory overheads	1,00,000
Work cost	8,30,000
Add: Opening work-in-process	12,000
Less: Closing work-in-process	(15,000)
(c) Factory cost	**8,27,000**
Add: Administration overheads	50,000
Cost of production	8,77,000
Add: Opening stock of finished goods	90,000
Less: Closing stock of finished goods	(1,10,000)
(d) Cost of goods sold	**8,57,000**
Add: Selling & distribution overheads	25,000
Cost of sales	8,82,000
(e) Net profit	**1,18,000**
Sales	10,00,000

23. Statement of Cost of SK Ltd. for the year ended 31st March

Particulars		Amount (₹)
Opening stock of raw material		6,20,000
Add: Material purchased		84,00,000
Less: Closing stock of raw material		(4,60,000)
Add: Carriage inward		1,72,600
Add: Consumable materials		4,80,000
	Raw material consumed	92,12,600
Add: Direct labour cost		
- Direct wages	60,00,000	

Particulars		Amount (₹)
- Employer's contribution towards PF & ESIS	7,20,000	67,20,000
Add: Direct expenses		
Cost of power & Fuel		28,00,000
Prime Cost		1,87,32,600
Add: Factory Overheads		
- Wages to foreman and store keeper	8,40,000	
- Other indirect wages to factory staff	1,35,000	9,75,000
Gross Factory Cost		1,97,07,600
Add: Opening WIP		7,84,000
Less: Closing WIP		(6,64,000)
Net Factory Cost		1,98,27,600
Add: Research & development cost		9,60,000
Add: Production planning office expenses		12,60,000
Cost of Production		2,20,47,600
Add: Opening stock of finished goods		14,40,000
Less: Closing stock of finished goods		(9,80,000)
Cost of goods sold		2,25,07,600
Add: Administrative overheads		
- Salary to accountants	7,20,000	
- Fee to statutory auditor	1,80,000	
- Fee to cost auditor	80,000	
- Fee to independent directors	9,40,000	19,20,000
Add: Selling overheads & Distribution overheads		
- Salary to delivery staff		14,30,000
Cost of Sales		2,58,57,600
Add: Profit (Balancing figure)		24,02,400
Sales		2,82,60,000

24.

Cost Sheet

Particulars	Amount (₹)
Opening stock of material	2,000
Add: Material purchases	1,80,000
Less: Closing stock of material	(1,350)
Raw material consumed	**1,80,650**
Add: Wages	1,78,650

Particulars			Amount (₹)
Add: Direct expenses			
Direct expenses	18,500		
Power	30,400		48,900
		Prime Cost	**4,08,200**
Add: Factory overheads			
Depreciation	18,000		
Factory salary	72,220	72,220	
Factory stores consumed (7,250 + 24,250 – 5,550)		25,950	1,16,170
		Factory cost	**5,24,370**
Less: Sales of factory scrap			(8,170)
		Cost of production	**5,16,200**
Add: Opening stock of finished mixture			1,750
Less: Closing stock of finished mixture [(5,24,370 × 450) ÷ 1,53,000]			(1,542)
		Cost of goods sold	**5,16,408**
Add: Administration overheads			
Office salaries	37,220		
Office expenses	18,200		55,420
Add: Selling & distribution overheads			
Selling salary	41,500		
Selling expenses	18,000		59,500
		Cost of sales	**6,31,328**
Add: Profit (Balancing figure)			2,86,672
		Sales	9,18,000

Units Produced = 1,53,050 + 450 – 500 = 1,53,000

25. Cost Sheet for the year ended 31st March 2018

Particulars	Amount (₹)
Raw material purchased	42,25,000
Add: Freight inwards	1,00,000
Add: Opening value of raw material	2,28,000
Less: Closing value of raw material	(3,05,000)
Less: Sale of scrap of material	(8,000)
Direct Material Consumed	42,40,000
Add: Direct Wages (12,56,000 + 1,50,000)	14,06,000

Particulars	Amount (₹)
Add: Direct Expenses	-
Prime Cost	56,46,000
Add: Factory Overheads (56,46,000 × 20%)	11,29,200
GFC	67,75,200
Add: Opening stock of WIP	1,92,500
Less: Closing stock of WIP	(1,40,700)
NFC	68,27,000
Add: Administrative Overheads (related to production)	1,73,000
COP	70,00,000
Add: Opening stock of FG	6,08,500
Less: Closing stock of FG	(5,32,000)
Cost of goods sold	70,76,500
Add: Distribution expenses (16 × 14,153)	2,26,448
Cost of Sales	73,02,948
Add: Profit (Bal. fig.)	14,43,606
Sales (618 × 14,153)	87,46,554

26.

(I) Cost Sheet

Particulars		Amount (₹)
Opening stock of raw material		10,000
Add: Raw material purchased		2,80,000
Less: Closing stock of raw material		(40,000)
Raw material consumed		2,50,000
Add: Manufacturing wages		70,000
Prime cost		3,20,000
Add: Factory overheads		
Depreciation on plant	15,000	
Lease rent of production assets	10,000	
Expenses for pollution control	1,000	26,000
Gross Factory Cost/ Net Factory cost		3,46,000
Add: Expenses paid for quality control check activities		4,000
Add: Administrative overheads (Production)		15,000
Add: Primary packing cost		8,000
Add: Research & development cost (Process related)		5,000
Cost of production		3,78,000
Add: Opening stock of finished goods		28,000
Less: Closing stock of finished goods (378000/3000 ×400)		(50,400)

Cost of goods sold	3,55,600
Add: Packing cost for redistribution of finished goods	1,500
Add: Advertisement expenses	1,300
Cost of sales	3,58,400

(II) Statement of calculation of selling price

Particulars	Amount (₹)
Cost of sales	3,58,400
Units sold (200 + 3,000 – 400)	2,800
Cost per unit	128
Add: Profit per unit [128 × (20/80)]	32
Selling price per unit	160

27. **Statement of cost and profit**

Particulars		Amount (₹)
Direct material		1,80,000
Add: Direct Labour		90,000
Add: Direct Expenses		
	Prime Cost	2,70,000
Add: Factory Overheads (10,000 × 8)		80,000
	GFC/NFC/COP	3,50,000
Add: Opening stock of FG		
Less: Closing stock of FG (400 × 87.50)		(35,000)
	Cost of goods sold	3,15,000
Add: Administration overheads		35,000
Add: Selling & Distribution overheads (5 × 3,600)		18,000
	Cost of Sales	3,68,000
Add: Profit		82,000
	Sales(125 × 3,600)	4,50,000

Cost per unit of goods produced = $\left(\frac{₹315000}{3600}\right) = ₹87.50$ per unit

28.

Cost sheet of SK Ltd. for month of .....
Units produced – 1,94,000
Units sold – 1,60,000

Particulars	(₹)	Cost per unit (₹)
Raw materials purchased	1,44,00,000	
Add: Opening value of raw materials	12,00,000	
Less: Closing value of raw materials	(14,00,000)	

Particulars	(₹)	Cost per unit (₹)
Materials consumed	1,42,00,000	73.19
Wages paid to production workers	36,64,000	18.89
Expenses paid for utilities	1,45,600	0.75
Prime Cost	**1,80,09,600**	**92.83**
Factory overheads (₹ 8 × 2,600 hours)	1,72,800	
Add: Opening value of W-I-P	18,00,000	
Less: Closing value of W-I-P	(16,04,000)	
Cost of Production	**1,83,78,400**	**94.73**
Add: Value of opening finished stock	9,60,000	
Less: Value of closing finished stock (₹ 94.73 × 44,000)	(41,68,120)	
Cost of Goods Sold	**1,51,70,280**	**94.81**
Office and administration expenses paid	26,52,000	16.58
Travelling allowance paid to office staffs	1,21,000	0.75
Selling expenses	6,46,000	4.04
Cost of Sales	1,85,89,280	116.18
Add: Profit	32,80,461	20.50
Sales	**2,18,69,741**	**136.68**

29. **Statement of cost of production**

Particulars	Amount (₹)
Opening stock of raw material	2,88,000
Add: Raw material purchased	64,00,000
Less: Closing stock of raw material	(4,46,000)
Raw material consumed	62,42,000
Wages paid	23,20,000
Prime cost	85,62,000
Add: Repair & Maintenance cost of plant & machinery	9,80,500
Add: Insurance premium paid for plant & machinery	96,000
Gross factory cost	96,38,500
Add: Opening value of WIP	4,06,000
Less: Closing value of WIP	(6,02,100)
Net Factory cost	94,42,400
Add: Quality control cost	86,000
Add: Research & development cost	92,600
Add: Administrative overheads related with factory and production	9,00,000
Add: Primary packing cost	10,200
Less: Amount realized by selling scrap	(9,200)
Cost of production	1,05,22,000

Note:

(1) Other administrative overhead does not form part of cost of production.

(2) Salary paid to director (technical) is an administrative cost.

30. Number of bags manufactured = 1,000 units

Particulars		Amount (₹)
Leather sheets		3,20,000
Add: Cotton cloths		15,000
Add: Freight paid on purchase		8,500
Direct material consumed		3,43,500
Add: Direct wages (80 × 2,000)		1,60,000
Add: Direct expenses (10 × 2,000)		20,000
	Prime Cost	5,23,500
Add: Factory overheads:		
- Depreciation on machine [(22,00,000 × 90%) ÷ 120]	16,500	
- Factory rent [1,20,000 × (1,960 ÷ 2,400)]s	98,000	1,14,500
	GFC/NFC	6,38,000
Less: Realizable value of cuttings (150 × 35)		(5,250)
	Cost of Production	6,32,750
Add: Opening stock of bags		-
Less: Closing stock of bags		(63,275)
	Cost of Goods Sold	5,69,475
Add: Administrative Overheads		
- Staff salary	45,000	
- Rent [1,20,000 × (240 ÷ 2,400)]	12,000	57,000
Add: Selling and Distribution Overheads		
- Staff salary	72,000	
- Rent [1,20,000 × (200 ÷ 2,400)]	10,000	
- Freight paid on delivery of bags	18,000	1,00,000
	Cost of Sales	7,26,475

31.

Cost Sheet

Particulars		Amount (₹)
Opening stock of raw material		6,06,000
Add: Purchases		28,57,000
Less: Closing stock of raw material		(7,50,000)
	Raw Material Consumed	27,13,000
Add: Direct wages		37,50,000
	Prime Cost	64,63,000
Add: Factory expenses		21,25,000
	Gross Factory Cost	85,88,000

Add: Opening value of WIP	12,56,000
Less: Closing value of WIP	(14,22,000)
Net Factory Cost	84,22,000
Less: Sale of scrap	(26,000)
Cost of Production	83,96,000
Add: Value of opening finished goods	3,59,000
Less: Value of closing finished goods	(3,09,000)
Cost of Goods Sold	84,46,000
Add: Office and administration expenses	10,34,000
Add: Selling & Distribution expenses	7,50,000
Cost of Sales	1,02,30,000
Add: Profit (balancing figure)	31,70,000
Sales	1,34,00,000

32. Preparation of Cost Sheet for Cloth Masks

No. of units produced = 50,000 units

No. of units sold = 45,000 units

Particulars	Per unit (₹)	Total (₹)
Direct materials (Working note (i)	10.00	5,00,000
Direct wages (Working note (ii))	5.00	2,50,000
Prime cost	15.00	7,50,000
Production overhead (Working note (iii))	2.00	1,00,000
Factory Cost	17.00	8,50,000
Administration Overhead* (50% of Production Overhead)	1.00	50,000
Cost of production	18.00	9,00,000
Less: Closing stock (50,000 units – 45,000 units)	–	(90,000)
Cost of goods solid i.e. 45,000 units	18.00	8,10,00
Selling cost	2.00	90,000
Cost of sales/Total cost	20.00	9,00,000
Profit	15.00	6,75,000
Sales value (₹ 35 × 45,000 units)	35.00	15,75,000

Working Notes:

(i) Direct material cost per unit of Disposable Mask = M

Direct material cost per unit of Cloth Mask = 2M

Total Direct Material cost = 2M × 50,000 units + M × 1,50,000 units

Or, 12,50,000 = 1,00,000 M + 1,50,000 M

Or, $M = \frac{₹12,50,000}{2,50,000} = ₹5$

Therefore, Direct material Cost per unit of Cloth Mask = 2 × ₹5 = ₹10

(ii) Direct wages per unit for Cloth Mask = W

Direct wages per unit for Disposable Mask = 0.6 W

So, (W × 50,000) + (0.6 × 1,50,000) = ₹7,00,000
W = ₹5 per unit
Therefore, Direct material Cost per unit of Cloth Mask = ₹5

(iii) Production overhead per unit $\frac{₹4,00,000}{(50,000+1,50,000)} = ₹5$

Production overhead for Cloth Mask = ₹2 × 50,000 units = ₹1,00,000

*Administration overhead is related to production overhead in the question and hence to be considered in cost of production only.

33.

Cost Sheet

Particulars	Super Pen	
	Total	Per Unit
Direct Material $\left[\frac{(40,000\times 2)\times 800,000}{(40,000\times 2)+(1,20,000\times 1)}\right]$	3,20,000	8.00
Direct Wages $\left[\frac{(40,000\times 1)\times 4,48,000}{(40,000\times 1)+(1,20,000\times 0.60)}\right]$	1,60,000	4.00
Prime Cost	4,80,000	12.00
Production Overheads $\left[\frac{40,000\times 1,92,000}{40,000\times 1,20,000}\right]$	48,000	1.20
Factory Cost	5,28,000	13.20
Add: Opening Stock	-	-
Less: Closing Stock [(40,000 – 36,000) × 13.20]	52,800	13.20
Cost of goods sold	4,75,200	13.20
Administration Overheads (200% × 1,60,000)	3,20,000	8.89
Add: Selling & Distribution (36,000 × 1)	36,000	1.00
Cost of Sales	8,31,200	23.09
Profit	2,48,800	6.91
Sales	10,80,000	30.00

34. (i) D
(ii) C Please refer cost sheet below for cost of production Cost of production per manshift = Cost of production ÷ Total manshift
₹7,87,28,000 + 46,800 = ₹1,682.22
(iii) A Car hire charges including GST @5%, please refer the cost sheet
(iv) B Selling and distribution cost includes the following:

Maintenance cost for weighing bridge	12,000
AMC cost of CCTV installed at weigh bridge	8,000
TA/ DA & hotel bill of sales manager	36,000
	56,000

For Cost of Sale please refer the cost sheet

(v) A Manshift = 1,000 employees × 26 days = 46,800 manshifts

Computation of earnings per manshift (EMS):

$$EMS = \frac{\text{Total employee benefits paid}}{\text{Manshift}}$$

$$= \frac{₹7,04,20,000}{46,800} = ₹1504.70$$

Computation of Output per manshift (OMS):

$$OMS = \frac{\text{Total Output/ Production}}{\text{Manshift}}$$

$$= \frac{2,34,000 \text{ Tonne}}{46,800} = 5 \text{ tonnes}$$

Workings

Cost Sheet of M Ltd. for the last month

Particulars	Amount (₹)	Amount (₹)
Materials consumes		50,00,000
Wages & Salary	6,40,00,000	
Gratuity & leave encashment	64,20,000	7,04,20,000
Power cost (13,000 kwh × ₹8)	1,04,000	
Diesel cost (2,000 ltr × ₹93)	1,86,000	2,90,000
HEMM hirin charges		30,00,000
Prime Cost		**7,87,10,000**
AMC cost of CCTV installed at factory premises		18,000
Cost of Production/Cost of Goods Sold		**7,87,28,000**
Hiring charges of cars	66,000	
Reimbursement of diesel cost	22,000	
	88,000	
Add: GST @5% on RCM basis	4,400	92,400
Maintenance cost for weighing bridge	12,000	
AMC cost of CCTV installed at weigh bridge	8,000	20,000
TA/DA & hotel bill of sales manager		36,000
Cost of Sales		**7,88,76,400**

❑❑❑

3 CHAPTER

Employee Cost and Direct Expenses

Labour Cost	• The term labour refers to all human resources of the organization • It may include workers, employees, staff, salesmen etc. • The compensation paid to all labour is known as labour cost • It can be either in monetary terms or non-monetary terms.
Employee Cost	• It is wider term than labour cost. • It includes wages, salary, bonus, incentive etc. paid to an employee and charged to a cost object as labour cost. • In general, both labour cost and employee cost are used interchangeably.
Direct Labour Cost	• Labour which can be readily identified with a specific job, contract or work order. • Its cost is directly charged to the specific job or order and forms part of prime cost. • It generally varies directly with the volume of output i.e. positive relation with output.
Indirect Labour Cost	• Labour which can't be readily identified with a specific job, or order. • Its cost can't be charged directly to specific job or order and is treated as part of overheads. • It may or may not vary directly with the volume of output.
Employee Cost Control	• The ultimate aim should be to keep the wages per unit of output as low as possible and this can be achieved by increasing efficiency.
Factors for Control of Employee Cost	• Correct assessment of manpower requirement • Control over time-keeping and time-booking • Time and motion study • Control over idle time and overtime • Control over employee turnover • Wages and incentive system • Job evaluation and merit rating • Employee productivity
Department Related with Employees	• Personnel Department • Engineering and Works Department • Time-keeping Department • Payroll Department • Cost Accounting Department

Personnel department	• This department is related to recruitment, evaluation performance etc. of employees • Various departments provide their requirement of employees through employee requisition form based on which it searches the right candidate for that department. • It ensures that person on job has the required qualification and skills for the job • It ensures proper training for the workers whether new or existing. • It maintains all records of personal and job related of all employees • It also evaluates performance from time to time.
Engineering and Work Study Department	• It is responsible for preparation of plans and specifications of each job or work. • It provides training and guidance to employees through which they can perform their work in the better way. • It supervises production activities • It conducts motion and time studies • It undertakes job analysis and also job evaluation.
Time-keeping Department	• It is concerned with the maintenance of attendance records i.e. time keeping • It records the time spent by an employee on various jobs i.e. time booking etc.
Payroll Department	• It is responsible for preparation of payroll of the employees. • It disburses salary and wages payment.
Cost Accounting Department	• It is responsible for accumulation and classification of employee costs. • It analyzes and allocate costs to various cost centers or cost objects. • It classifies direct wages which are to be included in direct cost of goods or services • It classifies indirect wages which are to be treated as indirect employee cost and thus becomes part of respective department overheads. • It calculates the cost of idle time or the loss incurred • It calculates the amount of abnormal loss or gain which is to be transferred to P&L
Time Keeping or Attendance Procedure	• It means recording the arrival and departure of each worker. • It is concerned with the attendance and wage calculation of the employees. • It is a way is to record the total time spent by the workmen in a factory. • This job is done by a job keeper. • It includes time booked and lost or idle time.
Objectives of time keeping	• Preparation of payroll • Computation of labour cost including overtime etc. • For ascertaining idle time • For overhead distribution • For disciplinary purpose

Various methods of time book keeping	• **Manual Methods** **(a) Attendance Register** ➢ A register is kept to record the arrival and departure time ➢ It is simple and suitable for small organizations **(b) Metal Disc or Token Method** ➢ It is very old and obsolete in practice now. ➢ Each employee is allotted metal disc or token bearing his identification number. ➢ It is handed to the time keeper who record the token number in register. • **Automated or Mechanical Methods** **(a) Punch Card Attendance** ➢ A punch card contains data related to employee in digital format. ➢ An employee either insert or wave card to a card reader which records the time in and time out of the employee. ➢ This system does not require time keeper and minimize risk of error and manipulation. **(b) Bio-metric Attendance** ➢ In this system, attendance is marked on the basis of physical and behavioral traits of an employee e.g. finger print, eye retina, face etc. ➢ It reduces the risk of time manipulation and proxy attendance. ➢ It is costly thus not suitable for small organizations.
Requisite of a Good Time Keeping System	• System should not allow proxy under any circumstances • System should be able to record time of piece employees • Both arrival and departure time should be recorded by system • System should be mechanical to reduce chances of manipulation • Late comers should record late arrivals • System should be simple, smooth and quick
Time Booking	• It means analyzing, charging or booking the total time spent on various jobs, day-by-day and person-by-person. • It refers to method wherein each activity of an employee is recorded. • For example, if a worker spends 8 hours in a day, the total time may be further analyzed as 3 hours on Job A, 2 hours or Job B, 4 hours on Job C and 1 hour normal idle time due to lunch etc.
Uses of Time Booking	• It is used to compute the cost of the job or activity based on the time spend on that job or activity. • It helps to measure the efficiency of employees by comparing the actual time taken by an employee with the standard time that should have been taken. • It helps to analyze variance in time taken and thereby fixing responsibility for the same.

Methods of time booking	• It can be done through preparing Job Card. • Job card can be of two types: **(a) Analysis of time with reference to job** ➢ A separate job card is maintained for each job. ➢ It records the total time spend on that job or operation. ➢ It helps to compute employee cost of that job quickly **(b) Job card with reference to employee** ➢ It keeps records of time spent by an employee in the organization including the idle time ➢ It helps in reconciliation of employee's job time with attendance time
Payroll Procedure	**Steps involved in payroll procedure are as follows:** • Attendance and time details • List of employees and other details • Computation of wage and other incentive • Payment to employees • Deposit of statutory liabilities
Idle Time	• It is the time during which workers remain idle i.e. no production is carried out. • The employer has to pay for this time though he doesn't derive any benefit of it. • In other words, it is the difference between the time for which workers are paid and the time they actually spend on production or jobs.
Normal idle time	• It is the almost unavoidable time and employer has to bear its cost. • Causes - going from one job to other, personal needs and tea breaks etc. • **Treatment** ➢ It is treated as a part of cost of production. ➢ In case of direct workers normal idle time is considered while setting standard hours or standard rate. ➢ In case of indirect workers, normal idle time is considered for the computation of overhead rate.
Abnormal idle time	• It is avoidable in nature. • Causes – due to strike, machine breakdown, power failure etc. • **Treatment** ➢ It may be treated as a loss and charged to Costing P&L Account. ➢ It should be further analyzed into controllable and uncontrollable ➢ Controllable abnormal time refers to the time that could have been saved had the management been more alert and efficient. ➢ Uncontrollable abnormal time refers to time lost over which management does not have any control.
Overtime	• It the work done beyond normal working hours. • Overtime payment consists of two elements i.e. normal wages for overtime work and premium payment for overtime work. • Overtime payment = Wages paid for overtime at normal rate + Premium for overtime

Overtime Premium	• It is the extra amount of wages paid over the normal rate. • According to Factories Act of 1948, a worker is entitled for overtime at double the rate of his wages if he works more than 9 hours in a day or more than 48 hours in a week.
Treatment of overtime premium	• If it is restored at the desire of the customer, then the entire amount of overtime should be charged to the job directly. • If it is due to a general pressure of work to increase the output, the premium as well as overtime wages may be charged general overheads. • If it is due to the negligence or delay of workers of a particular department, it may be charged to the concerned department. • If it is due to abnormal reasons, it may be charged to costing profit and loss account.
Time rate wage system	• In this system, a worker is paid at a fixed rate per hour or per day or per month for the time devoted by him irrespective of the volume of production during that time. • The time rate may be fixed with reference to rate prevailing in the industry for similar work but should not be less than the minimum wages fixed under the Minimum Wages Act or any other Act for the time being in force. Wages = Actual time devoted × Time rate
Advantages of time wage rate system	• It is easy to understand and simple to operate • It provides guaranteed time wages to workers • Workers concentrate on the quality rather than the quantity of job. • There is reduced damage or rough handling of machines, tools and equipments due to slow and steady pace of the workers.
Disadvantages of time wage rate system	• It does not act as an incentive to workers. • It tends to increase overhead cost and labour production cost per unit. • There develops a tendency to go slow during the normal working hours in the hope of getting overtime wages. • High degree of supervision is required to secure a fair day's work.
Output Based or Piece rate wage system	• Under this system, a worker is paid at a fixed rate per unit produced or job completed. • In this system, time spent on job is not considered for calculating wages. • Wages = Number of units produced × Price rate per unit
Advantages of piece rate wage system	• It is easy to understand and simple to operate • It acts as an incentive to workers to produce more and earn more. • It tends to reduce overhead cost and labour cost per unit because of high production. • It eliminates the tendency of workers to go slow as remuneration is directly linked with performance. • Low degree of supervision is required because the worker themselves take care of the time and output. • It simplifies cost ascertainment because labour cost per unit is available in advance.

Disadvantages of piece rate wage system	• It does not guarantee time wage to workers and hence workers feel insecure. • Workers tend to increase the quantity ignoring the quality thereof. • There may be excessive damage to machines, tools and equipment and excessive wastage of materials due to speedy pace of workers. • The calculation of piece rate is more difficult than time rate. • It is usually opposed by trade unions and workers. • It is detrimental to the long term health and working efficiency of the workers. • It is not suitable for setting up group incentive plans.
Halsey Premium Plan	• This plan was introduced by F.A. Halsey, an American engineer. • In this plan, standard time is fixed for a job and it guarantees the hourly wages to workers for the actual time taken. • Bonus is paid equal to wages of 50% of the time saved. • If the actual time taken is less than the standard time, the worker becomes eligible for bonus. Total Earnings = (H × R) + [50% × (S – H) × R]
Halsey Weir Plan	• Under this method, there is only one difference as compared to the Halsey Plan and that is instead of 50% bonus for the time saved, it is 33.33 % of the time saved. Total Earnings = (H × R) + [33.33% × (S – H) × R]
Advantages of Halsey Method	• It is easy to understand and simple to operate • It guarantees the hourly wages to workers for the actual taken time • It provides an incentive for an efficient worker who completes his work in less than the standard time • It provides an incentive to the employer to provide better production facilities as he receives 50% share in savings achieved.
Disadvantages of Halsey Method	• It is difficult to fix standard time. • Incentive is not so strong as with piece rate system. • The sharing principle may not be liked by employees. • It does not give full protection to employer against wrong rate setting.
Rowan Plan	• This premium bonus plan was introduced by Mr. James Rowan. • Under this system, a standard time allowance is fixed for the performance of a job and bonus is paid if time is saved. • Bonus is that proportion of time wages as time saved bears to the standard time. • Total Earnings = (H × R) + $\left[\left(\frac{S-H}{S}\right)\times H\times R\right]$
Advantages of Rowan Plan	• It guarantees the hourly wages to workers for the actual time taken. • It provides more incentive to moderately efficient workers who save time. • It provides an incentive to the employer to provide better production facilities as he receives a large share in savings achieved. • The sharing principle appeals to the employer as being equitable.

Disadvantages of Rowan Plan	• It is difficult to understand and complex to operate • It is difficult to fix standard time • It does not provide adequate incentive for a very efficient worker who saves time more than 50% of the standard time. • The sharing principle is not generally welcomed by employees.
Absorption Rate of Employee Cost	• For direct workers, rate per hour can be used to charge cost to jobs or units. • Rate per hour = $\frac{\text{Total Estimated Cost}(\text{monetary \& non–monetary})}{\text{Effective Employee Hours}}$ • Effective employee hours = Total Hours – Normal idle time
Efficiency Rating Procedures	• Efficiency is related with performance of employee • Efficiency in % = $\frac{\text{Time allowed as per standard}}{\text{Time taken}} \times 100$ • If the time taken by a worker equals or less than the standard time then he is rated efficient.
Procedure for Efficiency Rating	• Determining standard time or performance standards • Measuring actual performance of workers • Computation of efficiency rating
Need for Efficiency Rating	• Efficiency is directly related with payment of the employee • Efficiency helps in determining manpower requirements
Employee Productivity	• It is determined by the input-output ratio • Productivity = $\frac{\text{Standard time}}{\text{Actual time}}$ • It can be improved by reducing the input for a certain quantity or value of output or by increasing the output from the same given quantity of input.
Factors for Increasing Employee Productivity	• Employing the worker who possess right type of skill • Placing right type of person to a right job • Training young and old workers by providing them the right types of opportunities • Taking appropriate measures to avoid the situation of excess or shortage of employees • Carrying out work study for fixation of wages and for the simplification and standardization of work.
Labour Turnover	• It is the rate of change it the labour force of an organization during a specified period. • This rate of change is compared with a suitable index which acts as there meter to ascertain its reasonableness.

Methods for calculation of Labour Turnover	• **Separation Method** ➢ Under this method, labour turnover is computed on the basis of separations from the organization during a period. ➢ $\text{Labour Turnover Rate} = \frac{\text{No. of Seperations}}{\text{Average No. of workers}} \times 100$ • **Replacement Method** ➢ Under this method, labour turnover is computed on the basis of replacements in the organization during a period. ➢ $\text{Labour Turnover Rate} = \frac{\text{No. of Replacements}}{\text{Average No. of workers}} \times 100$ • **Flux Method** ➢ Under this method, labour turnover is computed on the basis of both separations and replacement from the organization during a period. ➢ $\text{Labour Turnover Rate} = \frac{\text{No. of Seperations + No. of Replacements}}{\text{Average No. of workers}} \times 100$ ➢ $\text{Labour Turnover Rate} = \frac{\text{No. of Seperations + No. of Joinee}}{\text{Average No. of worker}} \times 100$
Causes of Labour Turnover	• **Personal causes** ➢ Change of job for betterment ➢ Premature retirement due to ill health or old age ➢ Domestic problems and family responsibility • **Avoidable causes** ➢ Low wages ➢ Bad working conditions ➢ Dissatisfaction with the job s ➢ Lack of training facilities leading to the stagnation • **Unavoidable causes** ➢ Seasonal nature of the business ➢ Change in plant location ➢ Disability, making a worker unfit for work ➢ Disciplinary measures ➢ Shortage of raw material, power, slack market for the product etc.
Effects of High Labour Turnover	• Increased costs of selection of new workers and their training • Increase in scrap, wastes, etc. • Increase in cost of supervision. • Time lost between turnover and new recruitment. • Efficiency of new workers is low • Loss of output • Reduction in sales

Cost of Labour Turnover	• **Preventive Costs** ➢ These cost are incurred to prevent the labour from leaving the job. ➢ These costs are incurred in the form of giving more and more benefits and incentives to workers like free medical facilities, transport facilities, rent free housing etc. • **Replacement Costs** ➢ These costs are incurred after workers have left the company. ➢ Examples, cost of advertising the post, cost of recruitment and selection of workers, loss of production due to the delay in appointing new workers etc.
Steps to Minimize Labour Turnover	• Interview with each outgoing employees, to ascertain the reasons of his leaving the job. • Before recruiting workers, job analysis and evaluation may be carried out to ascertain the requirement of each job. • Scientific system of recruitment, selection, placement and promotion should be used. • The management should take the steps for creating a healthy working atmosphere. • Use of committee to handle issues like control over workers, handling their grievances etc.
Casual Workers (Badli Workers)	• These are employed temporarily for a short duration to cope up with sudden increase in volume of work. • These are generally engaged on daily basis and are paid either at the end of the day or after a periodic interval. • Wages paid are charged as direct or indirect labour cost depending on their identifiability.
Outdoor Workers	• These are the workers who don't carry their work in factory premises. • Generally they carry out assigned work in their homes or a site outside the factory. • Reconciliation of material issued from stores with the output should be prepared to avoid losses. • Completion of output during the stipulated time should be ensured to meet the orders.
Set-up Time	• It is the time incurred before the actual production of goods by machine or labour. • It may be due to changes from one job to another or because of break-downs etc. • It is also called as 'Making machines ready time'. • **Treatment** ➢ Normal setting-up time – It is spread over jobs actually completed by inflating the rate. ➢ Abnormal setting-up time – It is considered as loss & charged to Costing P&L Account.

Direct Expenses	• Expenses other than direct material cost and direct employee cost, which are incurred to manufacture a product or provision of service and can be directly traced in an economically feasible manner to a cost object. • These form part of the prime cost. • **For example:** ➢ Royalty paid or payable for production or provision of service ➢ Hire charges paid for hiring specific equipment ➢ Cost for product/service specific design or drawing ➢ Cost of product/service specific software ➢ Other expenses which are directly related with the production of goods or provision of service
Measurement of Direct Expenses	• These are measured at invoice price net of rebate or discount and includes duties and taxes (for which input credit is not available). • In case of job work or sub-contracting, these are measured at agreed price. • In case if principal supplies some materials to job worker, the value of such material and other identical expenses are added with the job charges paid to the job workers.

PRACTICE QUESTIONS

1. The following information relates to the personnel Department of a factory for the month of September:

Number of workers on September 1	1950
Number of workers on September 30	1,050
Number of workers who quit the factory in September	10
Number of workers discharged in September	30
Number of workers engaged in September (including 120 on account of expansion scheme)	140

Calculate the labour turnover rate and equivalent annual rate under the different methods.

Ans. Separation – 4%, 48.67%; Replacement – 2%, 24.33%; Flux – 18%, 219%.

2. The cost accountant of SK Ltd. has computed labour turnover rates for the quarter ending 31st March as 10%, 5% and 3% respectively under 'Flux Method', 'Replacement Method' and 'Separation Method'. If the number of workers replaced during the quarter is 30, find out the number of: **[SM]**

(a) workers recruited and joined; and

(b) workers left and discharged

(c) equivalent employee turnover rates for the year

Ans. (a) 42; (b) 18; (c) Separation – 12%; Replacement – 20%; Flux = 40%.

3. The management of SK Ltd. is worried about their increasing employee turnover in the factory and before analyzing the causes and taking remedial steps; it wants to have an idea of the profit foregone as a result of employee turnover in the last year. **[SM]**

Last year sales accounted to ₹83,03,300 and the P/V Ratio was 20%. The total number of actual hours worked by the direct labour force was 4.45 lakhs. The actual direct labour hours included 30,000 hours attributable to training new recruits, out of which half of the hours were unproductive. As a result of the delays by the Personnel Department in filling vacancies due to labour turnover, 1,00,000 potentially productive hours (excluding unproductive training hours) were lost.

The cost incurred consequent on labour turnover revealed, on analysis, the following:

Settlement Cost due to leaving	₹43,820
Recruitment Costs	₹26,740
Selection Costs	₹12,750
Training Costs	₹30,490

Assuming that the potential production lost due to labour turnover could have been sold at prevailing prices, find the profit/loss foregone last year on account of labour turnover.

Ans. ₹5,57,930.

4. SK Ltd. is engaged in BPO industry. One of its trainee executives in the Personnel department has calculated labour turnover rate 24.92% for the last year using Flux method. Following is the data provided by the Personnel department for the last year: **[MTP – Nov 2018]**

Employees	At the beginning	Joined	Left	At the end
Data processor	540	1,080	60	1,560
Payroll Processors	?	20	60	40
Supervisors	?	60	—	?
Voice Agents	?	20	20	?
Assistant Managers	?	20	—	30
Senior Voice Agents	4	—	—	12
Senior Data	8	—	—	34
Processors Team Leaders	?	—	—	?
Employees transferred from the Subsidiary Company				
Senior Voice Agents	—	8	—	—
Senior Data Processors	—	26	—	—
Employees transferred to the Subsidiary Company				
Team Leaders	—	—	60	—
Assistant Managers	—	—	10	—

At the beginning of the year there were total 772 employees on the payroll of the company. The opening strength of the Supervisors, Voice Agents and Assistant Managers were in the ratio of 3 : 3 : 2.

The company has decided to abandon the post of Team Leaders and consequently all the Team Leaders were transferred to the subsidiary company. The company and its subsidiary are maintaining separate set of books of account and separate Personnel Department.

You are required to calculate:

(a) Labour Turnover rate using Replacement method and Separation method.

(b) Verify the Labour turnover rate calculated under Flux method by the trainee executive of the SK Ltd.

Ans. (a) Replacement – 8.57%; Separation – 16.36%; (b) Flux = 112.46%.

5. In a factory working six days in a week and eight hours each day, a worker is paid at the rate of ₹100 per day basic plus D.A. @120% of basic. He is allowed to take 30 minutes off during his hours shift for meals-break and a 10 minutes recess for rest. During a week, his card showed that his time was chargeable to: **[SM]**

Job X	15 hrs.
Job Y	12 hrs.
Job Z	13 hrs.

The time not booked was wasted while waiting for a job. In cost accounting, state how would you allocate the wages of the workers for the week?

Ans. X = ₹450; Y = ₹360; Z = ₹390; P&L = ₹120.

6. Mr. S an employee of SK Co., gets the following emoluments and benefits: **[SM]**

(a) Basic pay	₹10,000 p.m.
(b) Dearness allowance	₹2,000 p.m.
(c) Bonus	20% of salary and D.A.
(d) Other allowances	₹2,500 p.m.
(e) Employer's contribution to P.F.	10% of salary and D.A.

Mr. S works for 2,400 hours per annum, out of which 400 hours are non-productive and treated as normal idle time. You are required to compute the effective hourly cost of employee Mr. S.

Ans. ₹108.60.

7. A worker is paid ₹10,000 per month and a dearness allowance of ₹2,000 p.m. Worker contribution to provident fund is 10% and employer also contributes the same amount as the employee. The employees state insurance corporation premium is 6.5% of wages of which 1.75% is paid by the employees. It is the firm's practice to pay 2 months' wages as bonus each year. **[SM]**

The number of working days in a year are 300 of 8 hours each. Out of these the worker is entitled to 15 days leave on full pay. Calculate the wage rate per hour for costing purposes.

Ans. ₹83.

8. It is seen from the job card for repair of the customer's equipment that a total of 154 labour hours have been put in as detailed below: **[SM]**

	Worker 'S' paid at ₹200 per day of 8 hours	Worker 'K' paid at ₹100 per day of 8 hours	Worker 'M' paid at ₹300 per day of 8 hours
Monday (hours)	10.5	8.0	10.5
Tuesday (hours)	8.0	8.0	8.0
Wednesday (hours)	10.5	8.0	10.5
Thursday (hours)	9.5	8.0	9.5
Friday (hours)	10.5	8.0	10.5
Saturday (hours)	-	8.0	8.0
Total (hours)	49.0	48.0	57.0

In terms of an award in a labour conciliation, the workers are to be paid dearness allowance on the basis of cost of living index figures relating to each month which works out @ ₹968 for the relevant month. The dearness allowance is payable to all workers irrespective of wages rate if they are present or are on leave with wages on all working days.

Sunday is a weekly holiday and each worker has to work for 8 hours on all week days and 4 hours on Saturdays; the workers are however paid full wages for Saturday (8 hours for 4 hours worked).

Workers are paid overtime twice of ordinary wage rate if a worker works for more than 9 hours a day or 48 hours in a week. Excluding holidays the total number of hours works out of 176 in the relevant month. The company's contribution to Provident Fund and Employees State Insurance Premium are absorbed into overheads. Work out the wages payable to each worker.

Ans. Worker S = ₹16,47; Worker K = ₹864; Worker M = ₹2,666.

9. SK Ltd. Pays the following to a skilled worker engaged in production works. The following are the employee benefits paid to the employee: **[RTP – Nov 2020]**

(a)	Basic salary per day	₹1,000
(b)	Dearness Allowance (DA)	20% of basic salary
(c)	House rent allowance	16% of basic salary
(d)	Transport allowance	₹50 per day of actual work
(e)	Overtime	Twice the hourly rate (considers basic and DA), only if works more than 9 hours a day otherwise no overtime allowance. If works for more than 9 hours a day then overtime is considered after 8th hour.
(f)	Work of holiday and Sunday	Double of per day basic rate provided works atleast 4 hours. The holiday and Sunday basic is eligible for all allowances and statutory deductions.

(g)	Earned leave & Casual leave	These are paid leave
(h)	Employer's contribution to Provident Fund	12% of basic and DA
(i)	Employer's contribution to Pension fund	7% of basic and DA

The company normally works 8-hour a day and 26-day in a month. The company provides 30 minutes lunch break in between.

During the month of August 2020, Mr. P works for 23 days including 15th August and a Sunday and applied for 3 days of casual leave. On 15th August and Sunday he worked for 5 and 6 hours respectively without lunch break. On 5th and 13th August, he worked for 10 and 9 hours respectively.

During the month Mr. P worked for 100 hours on Job no. SK103. You are required to calculate:

(i) Earnings per day

(ii) Effective wages rate per hour of Mr. P

(iii) Wages to be charged to Job no. SK103

Ans. (i) ₹1,638; (ii) ₹269.70; (iii) ₹26,970.

10. In a factory, the basic wage rate is ₹100 per hour and overtime rates are as follows: **[SM]**

Before and after normal working hours	:	175% of basic wage rate
Sundays and holidays	:	225% of basic wage rate
During the previous year the following hours were worked	:	
Normal hours	:	1,00,000 hours
Overtime before and after working hours	:	20,000 hours
Overtime on Sundays and holidays	:	5,000 hours
Total	:	1,25,000 hours
The following hours have been worked on job 'S'		
Normal	:	1,000 hours
Overtime before and after working hours	:	100 hours
Sundays and holidays	:	25 hours
Total	:	1125 hours

You are required to calculate the labour cost chargeable to job 'S' and overhead in each of the following instances:

(a) Where overtime is worked regularly throughout the year as a policy due to the labour shortage

(b) Where overtime is worked irregularly to meet the requirements of production.

(c) Where overtime is worked at the request of the customer to expedite the job.

Ans. (a) ₹1,31,625; (b) ₹1,12,500; (c) ₹1,23,125.

11. Calculate the earnings of S and K from the following particulars for a month and calculate the labour cost to each job A, B and C. **[SM, Similar Nov 2020]**

	S	K
Basic Wages	₹10,000	₹16,000
Dearness allowance	50%	50%
Contribution of provident fund (on basis wages)	8%	8%
Contribution of employee's state insurance (on basic wages)	2%	2%
Overtime (hours)	10	---

The normal working hours for the month are 200. Overtime is paid as double the total of normal wages and dearness allowance. Employer's contribution to state insurance and provident fund are at equal rates of employee's contribution. The two workers were employed on jobs A, B and C in the following properties:

	A	B	C
Worker S	40%	30%	30%
Worker K	50%	20%	30%

Overtime was done on Job B.

Ans. Net Wages S = ₹15,500; K = ₹22,400; Labour cost of A = ₹19,200; B = ₹11,420; C = ₹12,480.

12. Calculate the earnings of a worker under Halsey system and Rowan system. The relevant data is as below: **[SM]**

Time rate (per hour)	₹60
Time allowed	8 hours
Time taken	6 hours
Time saved	2 hours

Ans. Halsey = ₹420; Rowan = ₹450.

13. M/s SK Private Limited allotted a standard time of 40 hours for a job and the rate per hour is ₹75. The actual time taken by a worker is 30 hours. You are required to calculate the total earnings under the following plans: **[May 2019]**

(i) Halsey Premium Plan (Rate 50%)
(ii) Rowan Plan
(iii) Time wage system
(iv) Piece Rate System

Ans. (i) ₹2,625; (ii) ₹2,813; (iii) ₹2,250; (iv) ₹3,000.

14. A skilled worker in SK Ltd. is paid a guaranteed wage rate of ₹30 per hour. The standard time per unit for a particular product is 4 hours. Mr. S, a machine man has been paid wages under the Rowan Incentive Plan and he had earned an effective hourly rate of ₹37.50 on the manufacture of that particular product. **[MTP May 2024]**

What could have been his total earnings and effective hourly rate, had he been put on Halsey Incentive Scheme (50%)?

Ans. ₹105.

15. Two workmen, 'S' and "K', produce the same product using the same material. Their normal wage rate is also the same. 'S' is paid bonus according to the Rowan system, while 'K' is paid bonus according to the Halsey system. The time allowed to make the product is 50 hours. 'S' takes 30 hours while 'K' takes 40 hours to complete the product. The factory overhead rate is ₹5 per man-hour actually worked. The factory cost for the product for 'S' is ₹3,490 and 'K' it is ₹3,600. Required: **[SM, Similar Nov 2019]**

(a) Compute the normal rate of wages

(b) Compute the cost of materials cost

(c) Prepare a statement comparing the factory cost of the products as made by the two workmen.

Ans. (a) ₹20; (b) ₹2,500.

16. Mr. S is working by employing 10 skilled workers. He is considering the introduction of some incentive scheme - either Halsey Scheme (with 50% bonus) or Rowan Scheme - of wage payment for increasing the labour productivity to cope with the increased demand for the product by 25%. He feels that if the proposed incentive scheme could bring about an average 20% increase over the present earnings of the workers, it could act as sufficient incentive for them to produce more and he has accordingly given this assurance to the workers. **[SM, Similar Jan 2021]**

As a result of this assurance, the increase in productivity has been observed as revealed by the following figures for the current month:

Hourly rate of wages (guaranteed)	₹40.00
Average time for producing 1 piece by one worker at the previous performance (This may be taken as time allowed)	2 hours
No. of working day in the month	25
No. of working hours per day for each worker	8
Actual production during the month	1,250 units

Required:

(a) Calculate effective rate of earnings per hour under Halsey Scheme and Rowan Scheme.

(b) Calculate the savings to Mr. S in terms of direct labour cost per piece under the above schemes.

(c) Advice Mr. S about the selection of the scheme to fulfill his assurance.

Ans. (a) Halsey = ₹45; Rowan = ₹48; (b) Halsey = ₹8; Rowan = ₹3.20; (c) Rowan.

17. Wage negotiations are going on with the recognized employees' union and the management wants you as an executive of the company to formulate an incentive scheme with a view to increase productivity. **[SM]**

The case of three typical workers A, B and C who produce respectively 180, 120 and 100 units of the company's product in a normal day of 8 hours is taken up for study.

Assuming that day wages would be guaranteed at ₹75 per hour and the piece rate would be based on a standard hourly output of 10 units, calculate the earnings of each of the three workers and the employee cost per 100 pieces under (i) Day wage, (ii) Piece rate, (iii) Halsey scheme and (iv) Rowan scheme.

Also calculate under the above schemes the average cost of labour for the company to produce 100 pieces.

Ans. (i) ₹333.33; ₹500; ₹600; ₹450; (ii) ₹750; ₹750; ₹750; ₹750; (iii) ₹541.67; ₹625; ₹675; ₹600; (iv) ₹518.33; ₹666.67; ₹720; ₹613.25.

18. SK Ltd. is an engineering manufacturing company producing job order on the basis of specification given by the customers. During the last month it has completed three jo works namely A, B and C. The following are the items of expenditures which are incurred apart from direct materials and direct employee cost: **[SM]**

(i) Office and administration cost - ₹3,00,000
(ii) Product blueprint cost for job A - ₹1,40,000
(iii) Hire charges paid for machinery used for job work B - ₹40,000
(iv) Salary to office attendants - ₹50,000
(v) One time license fee paid for software used to make computerized graphics for Job C - ₹50,000
(vi) Salary paid to marketing manager - ₹1,20,000.

Required to calculate direct expenses attributable to each job.

Ans. ₹1,40,000; ₹40,000; ₹50,000.

PRACTICE QUESTIONS

19. From the following information, calculate employee turnover rate using – (a) Separation Method, (b) Replacement Method, (c) New Recruitment Method, and (d) Flux Method:

[RTP – May 2020]

No. of workers as on 01.04.2020 = 3,600

No. of workers as on 31.03.2021 = 3,790

During the year, 40 workers left while 120 workers were discharged. 350 workers were recruited during the year, of these 150 workers were recruited because of exists and the rest were recruited in accordance with expansion plans.

Ans. (a) 4.33%; (b) 4.06%; (c) 5.41%; (d) 13.80%.

20. The information regarding number of employees on roll in a shopping mall for the month of December 2017 are given below: **[May – 2018]**

Number of employees as on 01-12-2017	900
Number of employees as on 31-12-2017	1100

During December, 2017, 40 employees resigned and 60 employees were discharged. 300 employees were recruited during the month. Out of these 300 employees, 225 employees were recruited for an expansion project for the mall and rest were recruited due to exit of employees.

Assuming 365 days in a year, calculate Employee Turnover Rate and Equivalent Annual Employee Turnover Rate by applying the following:

(i) Replacement Method
(ii) Separation Method
(iii) Flux Method

Ans. (i) 7.5%, 88.31%; (ii) 10%, 117.74%; (iii) 40%, 470.97%.

21. Following information is given of a newly setup organization for the year ended on 31st March, 2021: **[July 2021]**

Number of workers replaced during the period	50
Number of workers left and discharged during the period	25
Average number of workers on the roll during the period	500

You are required to:
(i) Compute the employee turnover ratios using Separation Method and Flux Method.
(ii) Equivalent employee Turnover Rates for (i) above, given that for the organization was setup on 31st January, 2021.

Ans. (i) 5%; 15%; (ii) 30%; 90%.

22. PQR Limited has replaced 72 workers during the quarter ended 31st March, 2022. The labour rates for the quarter are as follows: **[May 2022]**

Flux Method	16%
Replacement Method	8%
Separation Method	5%

You are required to ascertain:
(i) Average number of workers on roll (for the quarter),
(ii) Number of workers left and discharged during the quarter,
(iii) Number of workers recruited and joined during the quarter,
(iv) Equivalent employee turnover rates for the year.

Ans. (i) 900; (ii) 45; (iii) 99; (iv) 64%; 32%; 20%.

23. The rate of change of labour force in a company during the year ending 31st March, 2013 was calculated as 13%, 8% and 5% respectively under 'Flux Method', 'Replacement Method' and 'Separation Method'. The number of workers separated during the year is 40. You are required to calculate:

(a) Average number of workers on roll
(b) Number of workers replaced during the year
(c) Number of new accessions i.e. new recruitment
(d) Number of workers at the beginning of the year

Ans. (a) 800; (b) 64; (c) 64; (d) 788.

24. SK Ltd. wants to ascertain the profit lost during the year 2020-21 due to increased labour turnover. For this purpose, they have given you the following information: **[RTP – May 2018]**

(1) Training period of the new recruits is 50,000 hours. During this period their productivity is 60% of the experienced workers. Time required by an experienced worker is 10 hours per unit.

(2) 20% of the output during training period was defective. Cost of rectification of a defective unit was ₹25.

(3) Potential productive hours lost due to delay in recruitment were 1,00,000 hours.

(4) Selling price per unit is ₹180 and P/V ratio is 20%.

(5) Settlement cost of the workers leaving the organization was ₹1,83,480.

(6) Recruitment cost was ₹1,56,340

(7) Training cost was ₹1,13,180

You are required to calculate the profit lost by the company due to increased labour turnover during the year 2020-21.

Ans. ₹9,00,000.

25. Calculate the employee hour rate of a worker S from the following data: **[SM]**

Basic pay	₹10,000 p.m.
D.A.	₹3,000 p.m.
Fringe benefits	₹1,000 p.m.

Number of working days in a year 300. 20 days are availed off as holidays on full pay in a year. Assume a day of 8 hours.

Ans. ₹75.

26. Following data have been extracted from the books of M/s ABC Private Limited: **[Nov – 2018]**

Salary (each employee, per month)	₹30,000
Bonus	25% of salary
Employer's contribution to PF, ESI etc.	15% of salary
Total cost at employees' welfare activities	₹6,61,500 per annum
Total leave permitted during the year	30 days
Number of employees	175
Normal idle time	70 hours per annum
Abnormal idle time (due to failure of power supply)	50 hours
Working days per annum	310 days of 8 hours

You are required to calculate:

(1) Annual cost of each employee

(2) Employee cost per hour

(3) Cost of abnormal idle time, per employee

Ans. (1) ₹5,07,780; (2) ₹234; (3) ₹11,700.

27. A total of 108 labour hours have been put in a particular job card for repair work engaging a semi-skilled and skilled labour (Mr. Deep and Mr. Sam respectively). **[RTP – May 2022]**

The hours devoted by both the workers individually on daily basis for this particular job are given below:

Monday	Tuesday	Wednesday	Thursday	Friday
10.5	8.0	10.5	9.5	10.5

The skilled labour also worked on Saturday for 10 hours.

Sunday is a weekly holiday and each worker has to work for 8 hours on all week days and 5 hours on Saturdays; the workers are however paid full wages for Saturday (8 hours for 5 hours worked).

Semi-skilled and skilled worker is paid ordinary wage @₹400 and ₹600 respectively per day of 8 hours labour. Further, the workers are also paid dearness allowance @20%. Extra hours worked over and above 8 hours are also paid at ordinary wage rate however, overtime premium of 100% of ordinary wage rate is paid if a worker works for more than 9 hours in a day and 48 hours in a week.

You are required to compute the wages payable to Mr. Deep (semi-skilled) and Mr. Sam (skilled).

Ans. Deep = ₹3,240; Sam = ₹5,850.

28. A worker takes 15 hours to complete a piece of work for which time allowed is 20 hours His wage rate is ₹5 per hour. Following additional information are also available: **[May 2018]**

Material cost of work	₹50
Factory overheads	100% of wages

Calculate the factory cost of work under the following methods of wage payments:

(i) Rowan Plan

(ii) Halsey Plan

Ans. (i) ₹237.50; (ii) ₹225.

29. A skilled worker in PK Ltd. is paid a guaranteed wage rate of ₹15.00 per hour in a 48-hour week. The standard time to produce a unit is 18 minutes. During a week, a skilled worker – Mr. 'A' has produced 200 units of the product. The company has taken a drive for cost reduction and wants to reduce its labour cost. **[Nov 2022]**

You are required to:

(i) Calculate wages of Mr. 'A' under each of the following methods:

  (a) Time rate

  (b) Piece rate with a guaranteed weekly wage

  (c) Halsey Premium plan

  (d) Rowan Premium Plan

(ii) Suggest which bonus plan i.e. Halsey Premium plan or Rowan Premium Plan the company should follow.

Ans. (i) (a) ₹720; (b) ₹900; (c) ₹810; (d) ₹864; (ii) Halsey plan.

30. SMC Company Limited is producing a particular design of toys under the following existing incentive system: **[May 2023]**

Normal working hours in the week	48 hours
Late shift hours in the week	12 hours
Rate of payment	Normal working: ₹150 per hour
	Late shift: ₹300 per hour

Average output per operatior for 60 hours per week (including late shift hours): 80 toys

The company's management has now decided to implement a system of labour cost payment with either the Rowan Premium plan or the Halsey Premium Plan in order to increase output, eliminate late shift overtime and reduce the labour cost.

The following information is obtained:

The standard time allotted for ten toys is seven and half hours

Time rate: ₹150 per hour (as usual).

Assuming that the operator works for 48 hours in a week and produces 100 toys, you are required to calculate the weekly earnings for one operator under:

(i) The existing time rate

(ii) Rowan premium plan

(iii) Halsey premium plan (50%)

Ans. (i) ₹10,800; (ii) ₹9,792; (iii) ₹9,225.

31. A skilled worker is paid a guaranteed wage rate of ₹150 per hour. The standard time allowed for a job is 10 hours. He took 8 hours to complete the job. He has been paid the wages under Rowan Incentive Plan. **[Dec 2021]**

You are required to:

(i) Calculate an effective hourly rate of earnings under Rowan Incentive Plan.

(ii) Calculate the time in which he should complete the job, if the worker is placed under Halsey Incentive Scheme (50%) and he wants to maintain the same effective hourly rate of earnings.

Ans. (i) ₹180; (ii) 7.14 hours.

32. A job can be executed either through workman S or K. S takes 32 hours to complete the job while K finishes it in 30 hours. The standard time to finish the job is 40 hours.

The hourly wage rate is same for both the workers. In addition, workman S is entitled to receive bonus according to Halsey plan (50% sharing) while K is paid bonus as per Rowan plan. The works overheads are absorbed on the job at ₹7.50 per labour hour worked. The factory cost of the job comes to ₹2,600 irrespective of the workman engaged.

Interpret the hourly rate and cost of raw materials input. Also show cost against each element of cost included in factory cost.

Ans. Hourly rate of wage = ₹10; Cost of material = ₹2,000.

33. SK Pvt. Ltd. manufactures a product which requires skill and precision in work to get quality products. The company has been experiencing high labour cost due to slow speed of work. The management of the company wants to reduce the labour cost but without compromising with the quality of work. It wants to introduce a bonus scheme but is indifferent between the Halsey and Rowan scheme of bonus. **[RTP – Nov 2019]**

For the month of March 2021, the company budgeted for 24,960 hours of work. The workers are paid ₹80 per hour. Required to calculate and suggest the bonus scheme where the time taken (in %) to time allowed to complete the works is (a) 100% (b) 75% (c) 50% & (d) 25% of budgeted hours.

Ans. Earning per hour under Halsey = ₹80; ₹93.33; ₹120; ₹200; Under Rowan = ₹80; ₹100; ₹120; ₹140.

34. You are given the following information of a worker: **[May 2011]**

(a)	Name of worker	:	'S'
(b)	Ticket No.	:	002
(c)	Work started	:	1 April at 8am
(d)	Work finished	:	5 April at 12 noon
(e)	Work allotted	:	Production of 2,160 units
(f)	Work done and approved	:	2,000 units
(g)	Time and units allowed	:	40 units per hour
(h)	Wage rate	:	₹25 per hour
(i)	Bonus	:	40% of time saved
(j)	Worker S worked 9 hours a day		

You are required to calculate the remuneration of the worker on the following basis:

(a) Halsey plan and

(b) Rowan plan

Ans. (a) ₹1,100; (b) ₹1,200.

35. (a) Bonus paid under the Halsey Plan with bonus at 50% for the time saved equals the bonus paid under the Rowan System. When will this statement hold good? (Your answer should contain the proof). **[SM]**

(b) The time allowed for a job is 8 hours. The hourly rate is ₹8. Prepare a statement showing:

(i) The bonus earned

(ii) The total earnings of employee and

(iii) Hourly earnings

Under the Halsey System with 50% bonus for time saved and rowan System for each hour saved progressively.

Ans. (a) AH = 50% of SH; (b) (ii) Halsey = ₹64; ₹60; ₹56; ₹52; ₹48; ₹44; ₹40; ₹36; Rowan = ₹64; ₹63; 60; ₹55; ₹48; ₹39; ₹28; ₹15.

36. A factory having the latest sophisticated machines wants to introduce an incentive scheme for its workers, keeping in view the following: **[SM]**

(i) The entire gains of improved production should not go to the workers

(ii) In the name of speed, quality should not suffer

(iii) The rate setting department being newly established are liable to commit mistakes.

You are required to prepare a suitable incentive scheme and demonstrate by an illustrative numerical example how your scheme answers to all the requirements of the management.

Ans. Rowan Plan.

37. SK Ltd. operates a boutique which rectify it as works for various fashion houses and retail stores. It has employed 26 workers and pays them on time rate basis. On an average an employee is allowed 8 hours for boutique work on a piece of garment. In the month of May 2021, two workers S and K were given 15 pieces and 21 pieces of garments respectively for boutique work. The following are the details of their work: **[RTP – May 2021]**

	S	K
Work Assigned	15 pieces	21 pieces
Time Taken	100 hours	140 hours

Workers are paid bonus as per Halsey System. The existing rate of wages is ₹60 per hour. AS per the new wages agreement the workers will be paid ₹72 per hour w.e.f. 1st June 2021. At the end of the month May 2021, the accountant of the company has wrongly calculated wages to these two workers taking ₹72 per hour.

Required:

(i) Calculate the loss incurred due to incorrect rate selection.

(ii) Calculate the loss incurred due to incorrect rate selection, had Rowan scheme of bonus payment followed.

(iii) Calculate the loss/savings if Rowan scheme of bonus payment had followed.

(iv) Discuss the suitability of Rowan scheme of bonus payment for SK Ltd.

Ans. (i) ₹1,320; ₹1,848; (ii) ₹1,400; ₹1,960; (iii) ₹80; ₹112.

38. A Company is undecided as to what kind of wage scheme should be introduced. The following particulars have been compiled in respect of three workers. Which are under consideration of the management. **[MTP May 2024]**

	I	II	III
Actual hours worked	380	100	540
Hourly rate of wages (in ₹)	40	50	60
Production in units:			
Product S	210	-	600
Product K	360	-	1350
Product M	460	250	-

Standard time allowed per unit of each product is:			
	S	**K**	**M**
Minutes	15	20	30

For the purpose of piece rate, each minute is valued at ₹1/-

You are required to calculate the wages of each worker under:

(a) Guaranteed hourly rate basis

(b) Piece rate earning basis, but guaranteed at 75% of basic pay (Guaranteed hourly rate if his earnings are less than 50% of basic pay).

(c) Premium bonus basis where the worker received bonus based on Rowan scheme.

Ans. (a) ₹15,200; ₹5,000; ₹32,400; (b) ₹24,150; ₹7,500; ₹36,000; (c) ₹16,050; ₹6,000; ₹35,640]

39. The following expenditures were incurred in SK Ltd. for the month of March: **[SM]**

		(₹)
(i)	Paid for power & fuel	4,80,200
(ii)	Wages paid to factory workers	8,44,000
(iii)	Bill paid to job workers	9,66,000
(iv)	Royalty paid for production	8,400
(v)	Fee paid to technician hired for the job	96,000
(vi)	Administrative overheads	76,000
(vii)	Commission paid to sales staff	1,26,000

You are required to calculate direct expenses for the month.

Ans. ₹15,50,600.

40. If the amount of wages under Halsey plan is ₹420, total time allowed is 8 hours and the guaranteed time rate is ₹60 per hour. What is the total time saved by the worker? **[MTP May-2024]**

(a) 2 hours (b) 3 hours (c) 6 hours (d) 3.5 hours

Ans. (a) 2 hours

41. The board of the J Ltd. has been appraised by the General Manager (HR) that the employee attrition rate in the company has increased. The following facts has been presented by the GM(HR):

1. Training period of the new recruits is 50,000 hours. During this period their productivity is 60% of the experienced workers. Time required by an experienced worker is 10 hours per unit. **[RTP May 2024]**
2. 20% of the output during training period was defective. Cost of rectification of a defective unit was ₹25.
3. Potential productive hours lost due to delay in recruitment were 1,00,000 hours.
4. Selling price per unit is ₹180 and P/V ratio is 20%.
5. Settlement cost of the workers leaving the organization was ₹1,83,480.
6. Recruitment cost was ₹1,56,340
7. Training cost was ₹1,13,180

You being an associate finance to GM(HR), has been asked the following questions:

(i) How much quantity of output is lost due to labour turnover?

(a) 10,000 units (b) 8,000 units (c) 12,000 units (d) 12,600 units

(ii) How much loss in the form of contribution, the company incurred due to labour turnover?

(a) ₹4,32,000 (b) ₹4,20,000 (c) ₹4,36,000 (d) ₹4,28,000

(iii) What is the cost repairing of defective units?

(a) ₹75,000 (b) ₹15,000 (c) ₹50,000 (d) ₹25,000

(iv) Calculate the profit lost by the company due to increased labour turnover.

(a) ₹7,50,000 (b) ₹15,00,000 (c) ₹5,00,000 (d) ₹9,00,000

(v) How much quantity of output is lost due to inexperience of the new worker?

(a) 1,000 units (b) 2,600 units (c) 2,000 units (d) 12,600 units

Ans. (i) - (c), (ii) - (a), (iii) - (b), (iv) - (d), (v) - (c).

SOLUTION OF PRACTICE QUESTIONS

19. Average number of workers = $\frac{3,600+3,790}{2}$ = 3,695

(a) Separation Method:

$$\text{Labour turnover rate} = \frac{\text{No. of separations}}{\text{Average number of workers}} \times 100 = \frac{40+120}{3,695} \times 100 = 4.33\%$$

(b) Replacement Method:

$$\text{Labour turnover rate} = \frac{\text{No. of replacements}}{\text{Average number of workers}} \times 100 = \frac{150}{3,695} \times 100 = 4.06\%$$

(c) New Recruitment Method:

$$\text{Labour turnover rate} = \frac{\text{No. of newly recruited workers}}{\text{Average number of workers}} \times 100 = \frac{350-150}{3,965} \times 100 = 5.41\%$$

(d) Flux Method:

$$\text{Labour turnover rate} = \frac{\text{No. of separations+No. of workers recruited}}{\text{Average number of workers}} \times 100 = \frac{160+350}{3,695} \times 100$$
$$= 13.80\%$$

20. Average number of workers = $\frac{900+1100}{2}$ = 1000

(i) Replacement Method:

$$\text{Labour turnover rate} = \frac{\text{No. of replacements}}{\text{Average number of workers}} \times 100 = \frac{75}{1000} \times 100 = 7.5\%$$

Equivalent Annual Labour turnover rate = $\frac{7.5\times365}{31}$ = 88.31%

(ii) Separation Method:

Labour turnover rate = $\frac{\text{No. of separations}}{\text{Average number of workers}}\times100 = \frac{40+60}{1000}\times100$ = 10%

Equivalent Annual Labour turnover rate = $\frac{10\times365}{31}$ = 117.74%

(iii) Flux Method:

Labour turnover rate = $\frac{\text{No. of separations+No. of workers recruited}}{\text{Average number of workers}}\times100 = \frac{100+300}{1000}\times100$

= 40%

Equivalent Annual Labour turnover rate = $\frac{40\times365}{31}$ = 470.97%

21. (i) Employee turnover ratio by separation method = $\frac{\text{No. of seperations}}{\text{Average no. of workers}}\times100$

$= \frac{25}{500}\times100$ = 5%

Employee turnover ratio by flux method = $\frac{\text{No. of seperations \& replacement}}{\text{Average no. of workers}}\times100$

$= \frac{(25+50)}{500}\times100$ = 15%

(ii) Equivalent employee turnover ratio under separation method = $\frac{5}{2}\times12$ = 30%

Equivalent employee turnover ratio under flux method = $\frac{15}{2}\times12$ = 90%

22. (i) Replacement Method - Labour turnover rate = $\frac{\text{No. of replacements}}{\text{Average number of workers}}\times100$

$8 = \frac{72}{\text{Average number of workers}}\times100$

Average number of workers = 900

(ii) Searation Method - Labour turnover rate = $\frac{\text{No. of sepearations}}{\text{Average number of workers}}\times100$

$5 = \frac{\text{No. of sepearations}}{900}\times100$

Number of separations (left and discharged) = 45

(iii) Flux Method - Labour turnover rate = $\frac{\text{No. of separations + No. of recruitments \& joinee}}{\text{Average number of workers}} \times 100$

$$16 = \frac{45 + \text{No. of recruitments \& joinee}}{900} \times 100$$

Number of workers recruited & joined = 99

(iv) Equivalent Employee turnover rate

Flux Method – Labour turnover rate = $\frac{16}{3} \times 12 = 64\%$

Replacement Method – Labour turnover rate = $\frac{8}{3} \times 12 = 32\%$

Separation Method – Labour turnover rate = $\frac{5}{3} \times 12 = 20\%$s

23. Separation Method - Labour turnover rate = $\frac{\text{No. of separations}}{\text{Average number of workers}} \times 100$

$$5 = \frac{40}{\text{Average number of workers}} \times 100$$

Average number of workers = 800

Replacement Method - Labour turnover rate = $\frac{\text{No. of replacements}}{\text{Average number of workers}} \times 100$

$$8 = \frac{\text{No. of replacements}}{800} \times 100$$

Number of workers replaced = 64

Flux Method - Labour turnover rate = $\frac{\text{No. of separations+No. of workers accessions}}{\text{Average number of workers}} \times 100$

$$13 = \frac{40+\text{No. of workers accessions}}{800} \times 100$$

Number of workers accessions = 64

Let workers at the beginning = y

Average number of workers = $\frac{\text{Workers at the begining+Workers at the end}}{2}$

$$800 = \frac{y+(y+\text{new accessions-separations})}{2}$$

$$1,600 = y + (y + 64 - 40)$$

$$1,600 = 2y + 24$$

$$y = 788 \text{ workers}$$

24. Output by experienced workers in 50,000 hours = $\frac{50,000}{10}$ = 5,000 units

$\therefore$ Output by new recruits = 60% of 5,000 = 3,000 units

Loss of output = 5,000 – 3,000 = 2,000 units

Total loss of output = Due to delay recruitment + Due to inexperience

= 10,000 + 2,000 = 12,000 units

Contribution per unit = 20% of ₹180 = ₹36

Total contribution lost = ₹36 × 12,000 units = ₹4,32,000

Cost of repairing defective units = 3,000 units × 0.2 × ₹25 = ₹15,000

Profit forgone due to labour turnover

Particulars	Amount (₹)
Loss of Contribution	4,32,000
Cost of repairing defective units	15,000
Recruitment cost	1,56,340
Training cost	1,13,180
Settlement cost of workers leaving	1,83,480
Profit forgone in 2017-18	**9,00,000**

25. (i) Effective working days in a year 300

Less: Leave days on full pay 20

Effective working days 280

Total effective working hours = 280 days × 8 hours = 2,240

(ii) Total wages paid in a year (₹)

Basic pay	1,20,000
D.A.	36,000
Fringe benefits	12,000
Total wages	1,68,000

(iii) Hourly rate = $\frac{1,68,000}{2,240}$ = ₹75.00

26. Calculation of effective hours

Total working hours (310 × 8) 2,480

Less: Leave days (30 × 8)	240
Available working hours	2,240
Less: Normal loss	70
Effective working hours	2,170

Statement of employee cost per hour

Particulars	Amount (₹)
Salary (30,000 × 12)	3,60,000
Bonus (25% × 3,60,000)	90,000
Employees contribution to PF (15% × 3,60,000)	54,000
Employee welfare (6,61,500 ÷ 175)	3,780
Total Annual Cost (A)	5,07,780
Effective working hours (B)	2,170
Employee cost per hour (A ÷ B)	234

Cost of abnormal idle time per employee = ₹234 × 50 hours = ₹11,700

27.

Calculation of total normal hours to be paid for Mr. Deep (Semi-skilled)

Day	Actual hours	Normal hours	Extra Hours	Overtime hours	Equivalent normal hours for overtime worked	Total normal hours payable
	A	**B**	**C**	**D = A – B**	**E = D × 2**	**F = B + C + E**
Monday	10.5	8	1	1.5	3	12
Tuesday	8	8	-	-	-	8
Wednesday	10.5	8	1	1.5	3	12
Thursday	9.5	8	1	0.5	1	10
Friday	10.5	8	1	1.5	3	12
Saturday	-	-	-	-	-	-
Total	**49**	**40**	**4**	**5**	**10**	**54**

Calculation of total normal hours to be paid for Mr. Sam (Skilled)

Day	Actual hours	Normal hours	Extra Hours	Overtime hours	Equivalent normal hours for overtime worked	Total normal hours payable
	A	**B**	**C**	**D = A – B**	**E = D × 2**	**F = B + C + E**
Monday	10.5	8	1	1.5	3	12
Tuesday	8	8	-	-	-	8
Wednesday	10.5	8	1	1.5	3	12
Thursday	9.5	8	1	0.5	1	10

Friday	10.5	8	1	1.5	3	12
Saturday	10	5	3 + 1 = 4	1	2	11
Total	**59**	**45**	**8**	**6**	**12**	**65**

Note: Mr. Sam will be paid for equivalent 8 normal working hours at ordinary wage rate, though 5 hours of working is required on Saturday because in question it is mentioned that both condition of 9 hour per day and 48 hour a week has to be satisfied. Thus, only 1 hour of overtime over 9 hours will be paid at overtime rate.

Wages Payable

Particulars	Mr. Deep	Mr. Sam
Basic wage per hour	400 ÷ 8 = 50	600 ÷ 8 = 75
Dearness allowance per hour @ 20%	10	15
Hourly wage rate	60	90
Total normal hours payable	54	65
Total wages payable	3,240	5,850

28. Wages in Rowan plan = (Actual time × wage rate) + $\left(\frac{\text{Std. time - Actual time}}{\text{Std. time}}\right)$ × Actual time ×wage rate

$$= (15 \times 5) + \left(\frac{5}{20}\right) \times 15 \times 5 = ₹93.75$$

Wages in Halsey plan = (Actual time× wages rate) + [50%×(Std. Time - Actual time)×wage rate]

$$= (15 \times 5) + \frac{50}{100} \times (20 - 15) \times 5 = ₹87.5$$

Statement showing computation of factory cost

Particulars	Rowan Plan	Halsey Plan
Direct Materials	50	50
Direct Wages	93.75	87.5
Prime Cost	143.75	137.5
Overheads @ 100% of wages	93.75	87.5
Factory Cost	237.5	225

29. (i) (a) Time Rate wages = Hours worked × rate per hour = 48 hours × ₹15 = ₹720

(b) Piece rate wages = Units produced × Rate per unit = 200 units × ₹4.50 = ₹900

$$\left(\text{Rate per unit} = \frac{18 \text{ minutes}}{60 \text{ minutes}} \times ₹15 = ₹4.50\right)$$

(c) Halsey plan wages = (H × R) + [(S – H) × R × 50%] = (48 × 15) + [(60 – 48) × 15 × 50%] = ₹810

(Standard hours = S = $\frac{18 \text{ minutes}}{60 \text{ minutes}} \times 200 \text{ units} = 60 \text{ hours}$

(d) Rowan plan wages = (H × R) + [(S – H) × R × $\frac{H}{S}$] = (48 × 15) + [(60 – 48) × 15 × $\frac{48}{60}$] = ₹864

(ii) The company may follow Halsey premium plan over Rowan plan as the total wages paid is lower.

30. (i) Weekly earning for one operator under existing time rate

= (48 hours × ₹150) + (12 hours × ₹300) = ₹10,800

(ii) Weekly earning for one operator under Rowan premium plan

= (H × R) + [(S – H) × R × $\frac{H}{S}$] = (48 × 150) + [(75 – 48) × 150 × (48 ÷ 75)] = ₹9,792

(iii) Weekly earning for one operator under Halsey premium plan

= (H × R) + [(S – H) × R × 50%] = (48 × 150) + [(75 – 48) × 150 × 50%] = ₹9,225

31. (i) Total earnings = (H × R) + [(S- H) × R × $\frac{H}{S}$] = (8 × 150) + $\left[(10-8)150\frac{8}{10}\right]$ = ₹1,440

Effective hourly rate of earning = $\frac{1,440}{8}$ = ₹180

(ii) Let actual time = y

Total Earnings = (H × R) + [(S – H) × R × 50%]

(y)(180) = (y × 150) + [(10 – y) × 150 × 50%]

180y = 150y + 750 – 75y

105y = 750

y = 7.14 hours

∴ Required actual hours = 7.14

32. Let hourly wage rate ₹X and let Cost of raw material ₹Y

Cost Sheet

	S	K
Cost of Raw Material	Y	Y
Normal wages	32X	30X
Bonus	(1/2 × 8 × X) = 4X	(10 × 3/4 × X) = 7.5X
Factory Overheads	(7.5 × 32) = 240	(7.5 × 30) = 225
Factory Cost	2600	2600

Y + 36X + 240 = 2,600 ..... (1)

Y + 37.5X + 225 = 2,600 ....(2)

Y = 2,360 – 36X

By Putting Y's value in equation (2)

2,360 – 36X + 37.5X + 225 = 2,600

1.5X = 15

X = 10

Y = 2,360 – 36 × 10 = Y = ₹2,000

Cost Sheet

	S	K
Cost of Raw Material	2,000	2,000
Normal wages	320	300
Bonus		
A = (1/2 × 8 × 10)	40	
B = (10 × 3/4 × 10)		75
Factory Overheads		
(7.5 × 32)	240	
(7.5 × 30)		225
Factory Cost	2600	2600

33. The cost of labour under the bonus schemes are tabulated as below:

Time Allowed	Time Taken	Wages	Bonus		Total wages		Earning per hour	
			Halsey	Rowan	Halsey	Rowan	Halsey	Rowan
(1)	(2)	(3) = (2)×80	(4)	(5)	(6) = (3)+(4)	(7) = (3)+(5)	(8) = (6)÷(2)	(9) =(7)÷(2)
24,960	24,960	19,96,800	–	–	19,96,800	19,96,800	80.00	80.00
24,960	18,720	14,97,600	2,49,600	3,74,700	17,47,200	18,72,000	93.33	100.00
24,960	12,480	9,98,400	4,99,200	4,99,200	14,97,600	14,97,600	120.00	120.00
24,960	6,240	4,99,200	7,48,800	3,74,400	12,48,000	8,73,600	200.00	140.00

* Bonus under Halsey Plan = 50% of (Time Allowed – Time Taken) × Rate per hour

** Bonus under Rowan Plan = $\frac{\text{Time taken}}{\text{Time allowed}}$ × Time saved × Rate per hour

Rowan scheme of bonus keeps checks on speed of work as the rate of incentive increases only upto 50% of time taken to time allowed but the rate decreases as the time taken to time allowed comes below 50%. It provides incentives for efficient workers for saving in time but also puts check on careless speed. On implementation of Rowan scheme, the management of ADV Pvt. Ltd. would resolve issue of the slow speed work while maintain the skill and precision required maintaining the quality of product.

34. Remuneration under Halsey Plan = (40 × 25) + (40% × 10 × 25) = 1,000 + 100 = ₹1,100

Remuneration under Rowan Plan = (40 × 25) + (10 × 25 × 40 / 50) = 1,000 + 200 = ₹1,200

Working note:

Time worked 1.4.11 = 9 hours

2.4.11 = 9 hours
3.4.11 = 9 hours
4.4.11 = 9 hours
5.4.11 = 4 hours
40 hours

Time allowed = 50 hours (2,000/40)
Time taken = 40 hours
Time saved = 10 hours

35. (a) Bonus under Halsey plan = Bonus under Rowan plan

$$50\% \times (SH - AH) \times R = \frac{AH}{SH} \times (SH - AH) \times R$$

$$50\% = \frac{AH}{SH}$$

$50\% \times SH = AH$

Hence, when the actual time (AH) taken is 50% of the time allowed (SH), the bonus under Halsey and rowan plan is equal.

(b) **Statement of Earnings**

SH	AH	Time Saved	Basic Wages (AH× 8)	Bonus Under Halsey (50%×C×8)	Bonus under Rowan $\left(\frac{B}{A} \times C \times 8\right)$	Total Earnings under Halsey (D + E)	Total Earnings under Rowan (D + F)	Hourly Earnings under Halsey (G ÷ B)	Hourly Earnings under Rowan (H ÷ B)
A	B	C = (A – B)	D	E	F	G	H	I	J
8	8	-	64	-	-	64	64	8	8
8	7	1	56	4	7	60	63	8.57	9
8	6	2	48	8	12	56	60	9.33	10
8	5	3	40	12	15	52	55	10.40	11
8	4	4	32	16	16	48	48	12	12
8	3	5	24	20	15	44	39	14.67	13
8	2	6	16	24	12	40	28	20	14
8	1	7	8	28	7	36	15	36	15

36.

(i) Rowan scheme of premium bonus (variable sharing plan) is suitable incentive scheme for the workers of the factory. If this scheme is adopted, the entire gains due to time saved by a worker will not pass to him.

➢ **Illustration**

- Time allowed = 4 hours
- Time taken = 3 hours
- Time saved = 4 – 3 = 1 hour
- Rate = ₹5 per hour
- Bonus = $\frac{\text{Time taken}}{\text{Time allowed}} \times \text{Time saved} \times \text{Rate} = \frac{3}{4} \times 1 \times 5 = ₹3.75$
- In the above data, 1 hour saved results in gain of ₹5 out of which ₹3.75 is passed on to the worker in form of bonus and the balance ₹1.25 remains with the management. In other words, worker is given with 75% of the time saved in form of bonus.

(ii) Another feature of this scheme is that a worker cannot increase his earnings or bonus by merely increasing its work speed. The reason for this is that the bonus under Rowan Scheme is maximum when the time taken by a worker on a job is half of the time allowed. As this fact is known to the workers, therefore, they work at such a speed which helps them to maintain the quality of output too.

- **Illustration**
- Assume above illustration data:
- Bonus when time taken is 2 hours = $\frac{\text{Time taken}}{\text{Time allowed}} \times \text{Time saved} \times \text{Rate} = \frac{2}{4} \times 2 \times 5 = ₹5$
- Bonus when time taken is 1 hours = $\frac{\text{Time taken}}{\text{Time allowed}} \times \text{Time saved} \times \text{Rate} = \frac{1}{4} \times 3 \times 5 = ₹3.75$
- The above data shows that when time taken is half of the time allowed, the bonus is maximum. When the time take is reduced from 2 to 1, the bonus amount decreases by ₹1.25.

(iii) Lastly, Rowan system provides a safeguard in the case of any loose fixation of the standards by the rate-setting department. It may be observed from the following illustration that in the Rowan Scheme the bonus paid will be low due to any loose fixation of standards. Workers cannot take undue advantage of such a situation.

- **Illustration**
- Assume in above illustration that if the rate setting department erroneously sets the time allowed as 10 hours instead of 4 hours, than bonus will be as follows:
- Bonus = $\frac{\text{Time taken}}{\text{Time allowed}} \times \text{Time saved} \times \text{Rate} = \frac{3}{10} \times 7 \times 5 = ₹10.50$
- The above data shows that bonus paid for saving 7 hours is ₹10.50 which is approximately equal to 2 hours wages. In other words, bonus paid to the worker is low.

37. Basic Calculation

Particulars	S	K

Actual hours taken	100 hrs.	140 hrs.
Standard hours	15 × 8 = 120 hrs.	21 × 8 = 168 hrs.
Hours saved	20 hrs.	28 hrs.

(i) Statement of calculation of loss due to incorrect rate selection

Particulars	S	K
Wages due @ ₹60 (A)	(100×60) + (20×60×50%) = 6,600	(140×60) + (28×60×50%) = 9,240
Wages paid @ ₹72 (B)	(100×72) + (20×72×50%) = 7,920	(140×72) + (28×72×50%) = 11,088
Extra wages paid (B – A)	1,320	1,848

(ii) Statement of calculation of loss due to incorrect rate selection under Rowan system

Particulars	S	K
Wages due @ ₹60 (A)	$(100\times60) + (20\times60\times\frac{100}{120}) = 7{,}000$	$(140\times60) + (28\times60\times\frac{140}{168}) = 9{,}800$
Wages paid @ ₹72 (B)	$(100\times72) + (20\times72\times\frac{100}{120}) = 8{,}400$	$(140\times72) + (28\times72\times\frac{140}{168}) = 11{,}760$
Extra wages paid (B – A)	1,400	1,960

(iii) Statement of calculation of saving due to Rowan system

Particulars	S	K
Extra wages paid under Halsey	1,320	1,848
Extra wages paid under Rowan	1,400	1,960
Difference (loss)	(80)	(112)

(iv) Rowan scheme of incentive payment has the following benefits which is suitable with the nature of business in which SK ltd. operates:

(a) Under Rowan scheme, workers cannot increase their earnings or bonus by merely increasing its work speed. Bonus under Rowan is maximum when the time taken by a worker on a job is half of the time allowed. As this fact is known to the workers, therefore they work at such a speed which helps them to maintain the quality of output too.

(b) It the rate setting department commits any mistake in setting standards for time to be taken to complete the words, the loss incurred will be relatively low.]

38.

(a) Computation of wages of each worker under guaranteed hourly rate basis

Worker	Actual hours worked	Hourly wage rate	Wages (₹)
I	380	40	15,200
II	100	50	5,000

III	540	60	32,400

(b) Computation of wages of each worker under piece work earning basis

Product	Piece rate per unit	Worker-I		Worker-II		Worker-III	
		Units	Wages	Units	Wages	Units	Wages
S	15	210	3,150	-	-	600	9,000
K	20	360	7,200	-	-	1,350	27,000
M	30	460	13,800	250	7,500	-	-
Total			24,150		7,500		36,000

Since each worker's earnings are more than 50% of basic pay. Therefore, worker-I, II and III will be paid the wages as computed i.e. ₹24,150, ₹7,500 and ₹36,000 respectively.

(c) Computation of wages of each worker under Rowan scheme

Worker	Time Allowed	Time Taken	Time Saved	Wage rate per hour	Earnings	Bonus	Total Earning
I	402.5	380	22.5	40	15,00	850	16,050
II	125	100	25	50	5,000	1,000	6,000
III	600	540	60	60	32,400	3,240	35,640

Working Notes:

(1) Piece rate per unit

Product	Standard time per unit in minute	Piece rate per minute	Piece rate per unit
S	15	1	15
K	20	1	20
M	30	1	30

(2) Time allowed to each worker

Worker	Product S	Product K	Product M	Total hours
I	210 × 15 = 3,150	360 × 20 = 7,200	460 × 30 = 13,800	24,150÷60 = 402.5
II	-	-	250 × 30 = 7,500	7,500÷60 = 125
III	600 × 15 = 9,000	1,350 × 20 = 27,000	-	36,000÷60 = 600

(3) Bonus of worker -I under Rowan = $\frac{380}{402.50} \times 22.5 \times 40 = 850$

Bonus of worker -II under Rowan = $\frac{540}{600} \times 60 \times 60 = 1,000$

Bonus of worker -III under Rowan = $\frac{540}{600} \times 60 \times 60 = 3,240$

39. Calculation of Direct Expenses

		(₹)
(i)	Paid for power and fuel	4,80,200
(ii)	Bill paid to job workers	9,66,000

(iii)	Royalty paid for production	8,400
(iv)	Fee paid to the technician	96,000
	Total direct expenses	**15,50,600**

40. (TT × 60) + [0.50 × (8 – TT) × 60] = 420 TT* = 6 hours
Time saved = 8 – 6 = 2
* TT = Total Time Taken.

41.(i)-(c) Output by experiences worker in 50,000 hours $= \frac{50,000}{10}$

$= 5,000$ units

$\therefore$ Output by new recruits = 60% of 5,000 = 3,9000 units

Loss out output =5,000 – 3,000 = 2,000 units

Total loss of output = Due to delay recruitment + Due to inexperience

= 10,000 + 2,000 =**12,000 units**

(ii) (a) Contribution per unit = 20% of ₹180 = ₹36

Total contribution lost = ₹36 × 12,000 units = **₹4,32,000**

(iii) (b) Cost of repairing defective unit = 3,000 units × 0.2 × ₹25

= **₹15,000**

(iv) (d) Calculation loss of profit due to labour turnover

	(₹)
Loss of Contribution	4,32,000
Cost of repairing defective units	15,000
Recruitment cost	1,56,340
Training cost	1,13,180
Settlement cost of workers leaving	1,83,480
Profit forgone in 2022-23	9,00,000

(v) (c) Output by experienced workers in 50,000 hours = $\frac{50,000}{10}$

= 5,000 units

$\therefore$ Output by new recruits = 60% of 5,000 = 3,000 units

Loss of output = 5,000 – 3,000 = **2,000 units**

❑❑❑

CHAPTER 4

Material Cost

Meaning of Material	• The general meaning of material is all commodities/physical objects supplied to an organization to be used in producing or manufacturing of finished or intermediate goods. • It may be classified as direct material or indirect material.
Control of Material	• It starts from 3Es i.e. Economy, Efficiency and Effectiveness • In other words, it is economy in procurement, efficiency in handling and processing the material and effectiveness in producing desired output as per the standard.
Importance of Material Control	• **Quality of final product** as it depends on quality of inputs. • **Price of final product** as material constitute significant part of any product • **Production continuity** depends on availability of material • To minimize **cost of stock holding and stock out** • To minimize **wastage and other losses**
Objective of Material Control	• **Minimized Cost** – Material should be purchased only when it is needed and in most economic quantities. • **Availability** – Material of desired quality should be available when needed to minimize interruption in production process. • **Lowest Purchase Price** – Purchasing of material will be made at the most favorable prices under the best possible terms. • **Minimum Investment** – Investment in material is maintained at minimum level consistent with the operating requirement. • **Material Storage** – Materials are, at all the time, charged as the responsibility of some individual. • **Reduction in Wastage** – Wastage and losses while the materials are in store should be avoided as far as possible.
Elements of Material Control	• It involves efficient functioning of the following operations: (*a*) Purchasing of material (*b*) Receiving of material (*c*) Inspection of material (*d*) Storage of material (*e*) Issuing material (*f*) Maintenance of inventory records (*g*) Stock audit

Steps involved in Purchase Procedure	• Depending upon the size and nature of the operations the purchase procedure may differ from organization to organization. However, the main steps involved in purchasing procedure are as follows: **Step – 1→** Receipt of purchase requisition **Step – 2→** Issue of enquiry letters and tenders **Step – 3→** Finalization of quotations and placing of purchase orders on suppliers **Step – 4→** Preparation, placement and follow up of purchase order **Step – 5→** Receipt of material **Step – 6→** Inspection of materials **Step – 7→** Return of rejected materials **Step – 8→** Checking and passing of purchase invoices for payments **Step – 9→** Making payment to supplier
Bill of Material or Material Specification List	• It is a complete schedule of component parts and raw materials required for a particular job or work order prepared by the drawing office/production planning/engineering department along with the necessary blue prints of drawings. • On this basis only, purchase requisitions are prepared by the production or maintenance department and sent to the purchase department for procurement of materials. • Uses of Bill of material by different departments: (*a*) Marketing or Purchase department – Materials are purchased based on the specification mentioned in bill of material (*b*) Production department – Production is planned based on the this and accordingly material requisition list is prepared. (*c*) Stores department – It is used as reference document while issuing materials to different departments (*d*) Cost or Accounting department – It is used to estimate cost and profit and becomes basis for verification or comparison.
Purchase Requisition	• It is a document prepared by the department requiring material to the purchase department to purchase the materials specified therein. • It provides for the information in respect of specification of the materials and quantity to be purchased. • It also gives the information as to when these materials are required. • It is prepared by stores keeper for regular material and by the departmental head for special materials (not stocked as regular items)
Purchase Order	• It is a document prepared by the purchase department which authorizes the supplier to supply the specified quantity of materials of specified quality at specified price on terms specified therein and commitment from buyer to accept and pay for the goods ordered.

Goods Receipt Note	• All materials and stores received during the day are recorded by storekeeper on Goods Received Note, which are numbered serially and are prepared in triplicate. • One copy of Goods Received Note is kept in store and other three copies are sent to purchase department, accounting department and order intending department.
Goods Inspection Note	• Inspection department checks the quality of material received to ensure that the quality of material is as per specifications stated in the purchase order. • After checking the quality, it prepares the inspection report to show the results of the inspection. • If the goods are rejected, reasons for such rejection are specified in this report. • The report is either prepared separately or incorporated in the goods received note.
Material Requisition Note	• It is a formal request, for the supply of specified materials, stores etc. to the production departments for a specific job or work order. • It authorizes the issuing department to draw from stores the requisitioned materials. • Such notes contain information about the description, code and quantity of materials needed. It also has job/work order number for which the material has been requisitioned.
Material Transfer Note	• The transfer of material from one job to another should be strictly prohibited unless the procedure is adequately recorded on the Material Transfer Note. • This should indicate all necessary data for debiting and crediting the concerned jobs or processes affected. • No entry is required in Bin Card and Stores Ledger for material transfer.
Material Returned Note	• It is prepared in case when the material is returned after its entry in the receiving report and account books should be adjusted accordingly.
Duties of Store Keeper	• General control over store • Safe custody of materials • Maintaining records • Initiate purchase requisition • Maintaining adequate level of stock • Issues of materials • Stock verification and reconciliation
Store Records	• It can be prepared in three forms: (*a*) Bin cards (*b*) Stock control cards (*c*) Stores ledger

Bin Card	• Bin refers to an almirah, a rack, box, container or space where materials are kept. • A separate bin is maintained for each item of material and is assigned an identification number. • A card is tied to or placed outside each bin to record the quantity of materials received, issued, returned and in hand in the bin. • This card is called bin card or stock card. • This card also contains particulars regarding maximum level, minimum level, reorder level, Bin no, name and code of material, location and stores ledger folio.
Two Bin System	• Under this system each bin is divided into two parts. • One smaller part, should stock the quantity equal to the minimum stock or even the re-ordering level, and the other to keep the remaining quantity. • Issues are made out of the larger part; but as soon as it becomes necessary to use quantity out of the smaller part of the bins fresh order is placed. • Two bin system is supplemental to the record of respective quantities on the bin card and the stores ledger card.
Stock Control Cards	• It is a quantitative record of inventory maintained by stores department for every item of material. • It shows overall inventory position in store.
Stores Ledger	• It records both quantity and cost of materials received, issued and those in stock. • It is maintained by the cost/accounts department.
Inventory Control	• Its main objective is to maintain a trade-off between stock-out and over-stocking. • It can be done on following basis: (*a*) By setting quantitative levels (*b*) On the basis of relative classification (*c*) Using ratio analysis (*d*) Physical control
Inventory Control by Setting Quantitative Levels	• It is done by setting various levels of stock which are as follows: (*a*) Re-order quantity or EOQ (*b*) Re-order level (*c*) Maximum level (*d*) Minimum level (*e*) Average level (*f*) Danger level (*g*) Buffer stock

Economic Order Quantity (EOQ) or Re-Order Quantity	• If purchases of material are made in bulk then inventory carrying cost will be high. • If order size is small each time, then the ordering cost will be high. • The size of the order for which both ordering and carrying cost are minimum is known as economic order quantity • Economic Order Quantity = $\sqrt{\frac{2 \times A \times O}{C}}$ A = Annual demand/annual consumption in units O = Cost of placing and receiving an order C = Carrying cost per unit per annum
Ordering Cost	• These are the costs which are associated with the purchasing or ordering of materials. It includes costs like tender invitation, transportation of goods, inspection costs etc.
Carrying Cost	• These are the costs for holding or storing goods in the stores. It includes costs like storage, rent, insurance, spoilage, deterioration etc.
Assumptions of EOQ	• Annual consumption/usage/requirement of raw material is known in advance. • Ordering cost per order is known and constant. • Cost per unit of the material to be purchased is known and it is constant. • Carrying cost is computed on average inventory ordered. • The rate of carrying cost remains constant. • The consumption/usage of material is expected to be even throughout the year.
Material Handling Cost	• It refers to the expenses involved in receiving, storing, issuing and handling materials. • These costs are included as part of the cost of materials either: • at the rate of percentage of the cost of material issued or • on the basis of weight of materials issued
Re-order Level	• It is the level at which purchase manager will issue a fresh purchase order with supplier. • It is fixed somewhere between maximum and minimum level. Re-order Level = Maximum Consumption × Maximum Re-order Period Re-order Level = Minimum Level + (Avg. Consumption × Avg. time) Re-order Level = Safety Stock + (Average Consumption × Average time)

Minimum Level	• It is the lowest quantity of a particular material which must be held in the store at all times. • It is the level of goods at which the fresh goods ordered earlier should reach the factory premises. • It is fixed to avoid the cost of under-stocking and shortage. Minimum Level = Re-order level – (Avg. consumption × Avg. Re-order period)
Maximum Level	• It is the level beyond which goods are not allowed to exceed. • In other words, it is the largest quantity of a particular material which may be held in the store at any time. • It is fixed to avoid the costs of over-stocking. Maximum Level = Re-order Level + Re-order Quantity – [Min. Consumption × Min. time]
Average Level or Normal Stock Level	• It is the average quantity of goods held in the stores. $\text{Average Level} = \frac{(\text{Maximum Level} + \text{Minimum Level})}{2}$ $\text{Average Level} = \frac{\text{Minimum Level} + (\text{Re-order Quantity})}{2}$
Danger Level	• Danger level is the level at which normal issues of the raw material inventory are stopped and emergency issues are only made on special requisition approved by the competent authority. • If it is fixed below the minimum level, then it is meant for taking urgent corrective action. • If it is fixed above the minimum level, then it is meant for taking urgent preventive action. Danger Level = Avg. Consumption × Re-order period for emergency purchases
Buffer Stock	• This stock is kept for contingency and to be used in case of sudden order.
Stock-Out	• It occurs when an inventory item could not be supplied due to insufficient stock in the store. • It leads to both financial and non-financial loss to company. • If high safety stock is maintained than it will lead to high carrying cost whereas in case of low or zero safety stock, it will lead to high stock out cost. • Thus, it is a trade-off between the carrying cost and stock-out cost.

<table>
<tr><td>Just in Time (JIT) Purchases</td><td>• It means the purchase of gods or materials such that delivery immediately precedes their use.
• It ensures that socks are as loss as possible or at zero level.
• It is implemented by developing closer relationship with supplier.
• It is also known as demand pull or pull through system of production.</td></tr>
<tr><td>ABC Analysis</td><td>• It stands for Always Better control Analysis.
• It exercises discriminating control over various items of inventory by classifying them into different categories on the basis of value, quantity, frequency of replacement etc.</td></tr>
<tr><td></td><td><table>
<tr><th>Category</th><th>% in total value</th><th>% in total quantity</th><th>Extent of control</th></tr>
<tr><td>A</td><td>70%</td><td>10%</td><td>Strict control through stock levels, EOQ etc.</td></tr>
<tr><td>B</td><td>20%</td><td>20%</td><td>Need based selective control</td></tr>
<tr><td>C</td><td>10%</td><td>70%</td><td>Little control – Focus on saving associated costs</td></tr>
</table></td></tr>
<tr><td>Advantages of ABC analysis</td><td>• Smooth Flow – It ensures that, there should be no danger of interruption of production.
• Cost saving – The cost of placing orders, receiving goods and maintaining stocks is minimized.
• Control by exception – Management time is saved since attention need to be paid only to some of the items rather than all the items.
• Standardization of work – It makes much of the work systematized on a routine basis.</td></tr>
<tr><td>FSN Analysis</td><td>• It is a measure of material control to determine the slow-moving and non-moving items to avoid the stocking of such items and consequential loss on its disposal. FSN stands for,
F = Fast Moving items; S = Slow Moving items;
N = Non-Moving items
• Fast moving items are consumed very rapidly and their stocks are to be replenished very frequently.
• Slow moving items are not frequently required or may be required once in a quarter or so.
• Non-moving items (Dormant stock) refer to those which are not moving temporarily but movement is expected soon.
• If non-moving items are not required then these are to be declared as surplus and its disposal should be done by tender or auction. The loss on disposal is treated as factory overheads.</td></tr>
</table>

VED analysis	• It is generally used for spare parts. • Spare parts are classified as Vital (V), Essential (E) and Desirable (D). • The vital spares are a must for running the concern smoothly and these must be stored adequately. • The E type of spares are also necessary but their stocks may be kept at low figures. • The stocking of D type of spares may be avoided at times. • A wrong classification of any spares will create difficulties for production department. The classification of spares should be left to the technical staff because they know the need, urgency and use of these spares.
HML Inventory	• It stands for High cost, Medium cost and Low cost inventory. • In this classification is done on the basis of cost of an individual item rather than overall basis. • High cost inventories are given more priority whereas medium and low cost items are given lesser priority.
Input-Output Ratio	• It is the ratio of quantity of input of material required to produce actual output. • It enables comparison of actual consumption and standard consumption.
Inventory Turnover Ratio	• It indicates the number of times inventory has moved out of stores. • This ratio indicates the efficiency or inefficiency with which inventories are maintained. • Its purpose is to ensure the blocking of only required minimum funds in inventory. • A high ratio indicates that goods are fast moving and vice-versa. $\text{Inventory Turnover Ratio} = \frac{\text{Cost of material consumed during the period}}{\text{Cost of average stock held during the period}}$ $= \ldots\ldots \text{ times}$ $\text{Also, Inventory held period} = \frac{\text{Days/Months/Weeks in a year}(365/12/52)}{\text{Inventory Turnover Ratio}}$
Periodic Inventory System	• It is a system in which inventory is computed whenever required on the basis of actual physical count/measure/weight. • Inventory is directly calculated by applying the method of valuation of inventories like FIFO, LIFO. • In this system, generally losses can't be detected at earlier stage. • This system is simple and less expensive.

<table>
<tr><td>Perpetual Inventory System</td><td>• It is a system in which a continuous record of receipt and issue of materials is maintained by the stores department.
• In this system the stock control cards, bin cards and stores ledger show the receipts, issue and balance of each item at any point of time after each transaction.
• The stocks as per dual records namely bin card and stores ledger are reconciled on a continuous basis.
• This system facilitates planning and control.</td></tr>
<tr><td>Continuous Stock Taking</td><td>• It is a system of physical verification of stocks of each item on continuous basis.
• The actual quantity in the bin card is compared with bin balances.
• Such verification is conducted round the year such that all items of stocks are verified 3 to 4 times in a year.
• Any discrepancies are investigated and reported for corrective action.
• It serves as a moral check on stores staff and acts as deterrent to dishonesty.</td></tr>
<tr><td>Treatment of discrepancies between actual stock and recorded stock</td><td><table>
<tr><th>Causes of Discrepancies</th><th>Treatment</th></tr>
<tr><td>1. Due to clerical errors (e.g. omission to post a receipt/issue, wrong recording of a receipt/ issue)</td><td>These discrepancies are rectified by passing a suitable rectifying entry in the relevant records.</td></tr>
<tr><td>2. Due to normal factors causing losses (e.g. shrinkage, evaporation, natural deterioration etc.)</td><td>The amount of these discrepancies is treated as part of cost either by inflating the cost per unit or by treating as part of factory overheads.</td></tr>
<tr><td>3. Due to abnormal factors (e.g. pilferages, fire, theft etc.)</td><td>The amount of these discrepancies is charged to costing profit & loss account.</td></tr>
<tr><td>4. Due to normal factors causing surpluses (e.g. appreciation in the weight)</td><td>The amount of these discrepancies is treated as reduction in overheads.</td></tr>
</table></td></tr>
<tr><td>Specific Price Method</td><td>• Under this method, purchases made for particular jobs are kept physically separate in the store rooms and store cards are made out for the individual purchases.
• When materials are issued for jobs, requisitions are priced at the exact cost as recorded on the appropriate store cards or at the price purchased.
• This system is time consuming, but it is used effectively, when non-standardized items of materials have to be purchased to meet a customer’s specification.</td></tr>
</table>

First-in-first out method (FIFO)	• It assumes that items first received are the first to be issued and that the requisitions are priced at the cost at which these items were placed in stock. • It is suitable when prices are falling. • Under this method, closing stock of material will be represented very closely at current market price.
Last-in-First-out Method (LIFO)	• It assumes that the last items purchased are the first to be used. • The balance on hand is priced at the cost of the earliest purchases. • It simply means that prices of the last purchase are used for accounting purposes first regardless of actual material flow. • It is suitable when prices are rising. • Under this method, cost of materials represent the current market price. • As per AS-2 and Ind AS-2, LIFO is not permitted.
FIFO under inflationary conditions	• When prices are rising, FIFO method may not reflect current prices in the material issues and, therefore, charge to production is unduly low. This method therefore tends to inflate profits
LIFO under inflationary conditions	• Under LIFO method, in times of inflation, charge to production is at the latest high price paid. This will result in lower profits and also lower tax liability.
LIFO and FIFO	• In LIFO method, production is charged with current market prices and hence pricing of the production is facilitated. • In case of FIFO method, production is charged with old price (i.e. low price under inflationary conditions). • Therefore, we prefer to use LIFO method so the product cost is near to market price.
Base Stock Method	• Under this method, minimum quantity of stock is always held at a fixed price as reserve in the stock, to meet the state of emergency if it arise. • The material other than base stock are valued using other methods like FIFO, LIFO etc.
Simple Average Method	• Under this method, material issues are valued at average price. • It is calculated by dividing the total of the prices of the materials in the stock, from which the material to be priced could be drawn, by the number of prices used in that total. • This method works well when there is little variation in the purchase prices. • The issue price is determined as follows: $$\text{Issue Price} = \frac{\text{Unit prices of materials in stock}}{\text{Number of purchases}}$$

Weighted Average Price Method	• Under this method, quantity of material purchased during a particular period is also taken into account. • Under this method weighted average price is calculated by dividing the total cost of material purchased during the accounting period, in which the material to be priced is used, by the total quantity of material purchased during that period. • A new average price is calculated at the end of each period, normally a month and is applied to all the issues in that month. Periodic weighted average price $= \frac{\text{Cost of material consumed during the period}}{\text{Cost of average stock held during the period}}$
Replacement Price Method	• Replacement price is the price at which it is possible to purchase an item, identical to that which is being replaced or revalued. • Material issues are valued at replacement cost of items. • Main objective is to make the product cost at current market price.
Realizable Price Method	• Realizable price is the price at which the material to be issued can be sold in the market. • This price may be more or less than the original cost price. • The stores ledger would show profit or loss in this method too.
Standard Price	• A standard price will be set for each material and is applied for all the issues in a period, normally a year.
	• It is fixed after taking into account factors such as current prices, anticipated market trends, discount available and transport charges etc. • Standard price should not be set on a long term basis. • It should be determined for short periods only and revised as and when necessary. • All receipts under this method are posted at actual prices and issues at standard prices for each material. • The difference between standard and actual is disposed of through price variance account.
Inflated Price	• It is a price which includes a charge designed to cover the cost of contingencies or related costs. • Normally, the invoice price includes the cost of freight, insurance and taxes less discounts. Other Expenses like cost of receiving, inspection, storing and carrying, handling of materials and losses arising out of evaporation and breaking-up bulk etc.; are treated as production overhead. • Under this method, all these expenses are added to determine the cost of issues. • Thus, inflated price will recover the full cost of materials.
Re-use Price Method	• When materials are rejected and returned to the stores then such materials are priced at a rate different from the price paid for them originally. • There is no final procedure for valuing use of material.

<table>
<tr><td>Treatment of material returned & shortage in stores ledger</td><td>
<table>
<tr><th>Item</th><th>How to record in Stores Ledger</th></tr>
<tr><td>1. Materials returned by stores to vendor</td><td>Such returns should be entered in the issue column and valued at the store ledger price which includes freight, receiving and handling charges etc.
Note: In practice such returns are valued at invoice price only and the difference between the store ledger price and invoice price is charged as overheads.</td></tr>
<tr><td>2. Materials returned to stores</td><td>There are two ways of treating such returns:
(a) Such returns are entered in the receipt column at the price at which they were originally issued, and the materials are kept in suspense, to be issued at the same price against the next requisition.
(b) Such returns are entered in the receipt column as if they were fresh purchases at the original issue price.</td></tr>
<tr><td>3. Shortages during physical verifications</td><td>Shortages of materials found during physical verifications should be entered in the issue column and valued at the rate as per the method adopted, i.e. FIFO or any other.</td></tr>
</table>
</td></tr>
<tr><td>Waste</td><td>• It represents the portion of basic raw materials lost in processing having no recoverable value.
• Waste may be visible—remnants of basic raw materials—or invisible, e.g. disappearance of basic raw materials through evaporation, smoke etc.
• Loss on normal wastage is usually charged to production by inflating the unit price of material used in such a way that total cost is recovered out of the smaller quantity actually used, whereas abnormal waste is transferred to the Costing Profit and Loss Account.</td></tr>
<tr><td>Scrap</td><td>• It has been defined as the incidental residue from certain types of manufacture, usually of small amount and low value, recoverable without further processing.
• Accounting Treatment:
• Where the value of scrap is negligible, it may be excluded from costs.
• The sales value of scrap is deducted from overhead to reduce the overhead rate.
• If scrap is identifiable with a particular job or process and its value is significant than credit is given to the job or process concerned.
• Scrap due to abnormal reasons will be transferred to the Costing P&L Account.</td></tr>
</table>

Spoilage	• It is the term used for materials which are badly damaged in manufacturing operations, and they cannot be rectified economically and hence taken out of process to be disposed off in some manner without further processing. • It involves not only the loss of material but also of labour and overheads incurred upto the stage where the spoilage has occurred. • Normal spoilage costs are included in costs either by charging the loss due to spoilage to the production order or charging it to production overhead. • Abnormal spoilages are charged to the Costing Profit and Loss Account.
Defective Work/Rejects	• It represents unit of output which fail to comply with a set quality standard and are subsequently rectified, sold as sub-standard or disposal as scrap. • Defective work may be due to various factors like poor quality of materials, incompetent supervision etc. • Accounting Treatment: • If defective work has a nominal value, the loss is completely absorbed by good units. • Alternatively, the cost of defective work can be charged as general factory overhead. • Alternatively, cost of defective work is charged directly to departments responsible for it. • The cost of defective work due to abnormal reasons shall be charged to the Costing P&L Account.
Rectification	• It means bringing back the defective units either to standard units of production or as seconds, by reworking. • The work of rectification in small concerns is usually entrusted to the production shop, whereas in big concerns, a separate department carries out the task. • The task of rectification is usually carried out under a 'Rectification Work Order'. • Accounting Treatment: • If it is due to normal consequences than it is charged to the jobs. • If it is due abnormal reasons then it is charged to Costing P&L Account.
Obsolescence	• It is the loss in the intrinsic value of an asset due to its supersession or technological advancements. • The loss arising out of obsolete materials is an abnormal loss and thus should be transferred to costing P&L.

PRACTICAL QUESTIONS

1. Calculate the economic order quantity from the following information. Also state the number of orders to be placed in a year. **[SM]**

Consumption of materials per annum	:	10,000 kg
Order placing cost per order	:	₹50
Cost per kg of raw materials	:	₹2
Storage costs	:	8 % on average inventory

Ans. 2,500 kg

2. A wholesaler supplies 30 stuffed dolls each weekday to various shops. Dolls are purchased from the manufacturer in lots of 120 each of ₹1200 per lot.

Every order incurs a handling charge of ₹60 plus a freight charge of ₹250 per lot. Multiple and fractional lots also can be ordered and all orders are filled the next day. The incremental cost is ₹0.60 per year to store a doll in inventory. The wholesaler finances inventory investments by paying its holding company 2% monthly for borrowed funds.

How many dolls should be ordered, at a time in order to minimize the total annual inventory cost? Assume that there are 250 weekdays in a year. How frequently he should order?

Ans. 7 orders; 1.71 months

3. A manufacturer buys certain equipment from outside suppliers at ₹20 per unit. Total annual needs are 900 units. The further data are available:

Annual return of investment	10%
Rent, Taxes, insurance per unit per year	₹2
Cost of placing an order	₹200

Determine the economic order quantity.

Ans. 300 units

4. (i) Compute EOQ and total variable cost for the following: **[SM]**

Annual Demand	=	5,000 units
Unit price	=	₹20
Order cost	=	₹16
Storage cost	=	2% per annum
Interest rate	=	12% per annum
Obsolescence rate	=	6% per annum

(ii) Determine the total cost that would result for the items if a new price of ₹12.80 is used.

Ans. (i) 200 units: ₹1,00,800; (ii) ₹64,640

5. SK Ltd. has received an offer of quantity discounts on its order of materials as under:

Tons (No.)	**Price per tons (₹)**
Less than 250	6.00
250 and less than 800	5.90
800 and less than 2,000	5.80
2,000 and less than 4,000	5.70
4,000 and above	5.60

The annual requirement for the materials is 4,000 tons. The ordering cost per order is ₹6 and the carrying cost is estimated at 20% per annum. You are required to compute the most Economic Order Quantity presenting the relevant information in a tabular form.

Ans. Order size of 800 units

6. A company manufactures a special product which requires a component 'Alpha'. The following particulars are collected for the year 2020:

(i) Annual demand of Alpha 8,000 units
(ii) Cost of placing an order ₹200 per order
(iii) Cost per unit of Alpha ₹400
(iv) Carrying cost p.a. 20%

The company has been offered a quantity discount of 4% on the purchase of 'Alpha' provided the order size is 4,000 components at a time.

Required:

(i) Compute the economic order quantity

(ii) State whether the quantity discount offer can be accepted.

Ans. (i) 200 units; (ii) Not to be accepted.

7. A company manufactures a product from a raw material which is purchased at ₹60 per kg. The company incurs a handling cost of ₹360 plus freight of ₹390 per order. The incremental carrying cost of inventory of raw material is ₹0.50 per kg per month. In addition, the cost of working capital finance on the investment in inventory of raw material is ₹9 per kg per annum. The annual production of the product is 1,00,000 units and 2.5 units are obtained from one kg of raw material.

[MTP – July 2020] [RTP – May 2023]

Required:

(a) Calculate the economic order quantity of raw material
(b) Advise, how frequently should orders for procurement be placed. (Assuming 360days in the year)
(c) If the company proposes to rationalize placement of orders on quarterly basis, what percentage of discount in the price of raw materials should be negotiated?

Ans. (a) 2,000 kg; (b) 18 days; (c) 2%

8. SK Ltd. which manufactures a product 'S' provides you the following information:

Monthly demand of 'S'	=	900 units
Cost of placing an order	=	₹75
Carrying cost per unit p.m.	=	2%
Cost of input to be purchased	=	₹50 per kg
Output per kg of input	=	1.5 units

Required:

(a) What percentage of discount in the price of input should be negotiated if the company proposes to rationalize placements of orders on monthly basis?

(b) Suppose the company followed the policy of economic order quantity and at the end of the year, it was found that the cost of placing an order was ₹108 instead of ₹75 and all other estimates were correct. What is the difference in cost on account of this error?

Ans. (a) 0.24%; (b) ₹72

9. SK Limited produces product 'S' which has a quarterly demand of 20,000 units. Each product requires 3kg and 4kg of material K and M respectively. Material K is supplied by a local supplier

and can be procured at factory stores at any time, hence, no need to keep inventory for material K. The material M is not locally available, it requires to be purchased from other states in a specially designed truck container with a capacity of 10 tons. **[RTP Nov 2019]**

The cost and other information related with the materials are as follows:

Particulars	Material-K	Material-M
Purchase price per kg (excluding GST)	₹140	₹640
Rate of GST	18%	18%
Freight per trip (fixed, irrespective of quantity)	-	₹28,000
Loss of materials in transit*	-	2%
Loss in process*	4%	5%

*On purchased quantity

Other information:

The company has to pay 15% p.a. to bank for cash credit facility.

Input credit is available on GST paid on materials.

Required:

(a) Calculate cost per kg of material K and M

(b) Calculate the economic order quantity for both the materials

Ans. (a) ₹145.83**;** ₹691.23; (b) 0 kg; 13,632.62 kg.

10. SK Ltd. manufactures a product S which requires two raw materials P and M in a ratio of 1:4. The sales department has estimated a demand of 5,00,000 units for the product for the year. To produce one unit of finished product, 4 units of material P is required. **[MTP – Nov 2019]**

Stock position at the beginning of the year is as below:

Product SK	12,000 units
Material P	24,000 units
Material M	52,000 units

To place an order the company has to spend ₹15,000. The company is financing its working capital using a bank cash credit @ 13% p.a.

Product SK is sold at ₹1,040 per unit. Material P and M are purchased at ₹150 and ₹200 respectively.

Required: Compute economic order quantity (EOQ):

(a) If purchase order for both materials is placed separately

(b) If purchase order for both materials is not placed separately

Ans. (a) 54,462 units; 94,600 units; (b) 21,592 units; 86,860 units.

11. SK Ltd. manufacturers of a special product, follows the policy of EOQ (Economic Order Quantity) for one of its components. The components details are as follows:

Purchase price per component	₹200
Cost of an order	₹100
Annual cost of carrying unit in Inventory	10% of purchase price
Total cost of carrying and ordering per annum	₹4,000

The company has been offered a discount of 2% on the price of the component provided the lot size is 2,000 components at a time.

You are required to:

(a) Compute the EOQ

(b) Advise whether the quantity discount offer can be accepted

(c) Would your advice differ if the company is offered 5% discount on a single order? (Assume that the inventory carrying cost does not vary according to discount policy)

Ans. (a) 200 units; (b) Not to accept offer; (c) Accept the offer

12. Two components, A and B are used as follows: **[SM]**

Normal usage	50 per week each
Maximum usage	75 per week each
Minimum usage	25 per week each
Re-order quantity	A:300; B:500
Re-order period	A: 4 to 6 weeks
	B: 2 to 4 weeks

Calculate for each component (a) Re-ordering level, (b) Minimum level, (c) Maximum level and (d) Average level

Ans. (a) 450 units; 300 units; (b) 200 units; 150 units; (c) 650 units; 750 units; (d) 425 units; 450 units

13. From the details given below, calculate: **[SM]**

(i) Re-ordering level

(ii) Maximum level

(iii) Minimum level

(iv) Danger level

Re-ordering quantity is to be calculated on the basis of following information:

Cost of placing a purchase order is ₹20.

Number of units to be purchased during the year is 5,000

Purchase price per unit inclusive of transportation cost is ₹50.

Annual cost of storage per unit is ₹5.

Details of lead time: Average – 10 days, Maximum- 15 days, Minimum- 5 days
For emergency purchase – 4 days

Rate of consumption: Average- 15 units per day
Maximum- 20 units per day

Ans. (i) 300 units; (ii) 450 units; (iii) 150 units; (iv) 60 units.

14. M/s SK Ltd. are the manufacturers of picture tubes for T.V. The following are the details of their operation during the year:

Average monthly market demand	2,000 tubes
Ordering cost	₹100 per order
Inventory carrying cost	20% per annum
Cost of tubes	₹500 per tube
Normal usage	100 tubes per week

Minimum usage	50 tubes per week
Maximum usage	200 tubes per week
Lead time to supply	6-8 weeks

Compute the following from the above information:

(a) Economic order quantity. If the supplier is willing to supply quarterly 1,500 units at a discount of 5%, is it worth accepting?

(b) Maximum level of stock

(c) Minimum level of stock

(d) Reorder level

Ans. (a) 102 tubes; Accept the offer (b) 1,600 tubes; (c) 900 tubes; (d) 1,402 tubes.

15. A company buys in lots of 6,250 units which is a 3 month's supply. The cost per unit is ₹2.40. Each order costs ₹45 and inventory carrying cost is 15% of average inventory value.

Required:

(a) What is the total annual cost of existing inventory policy?

(b) How much money could be saved by employing the economic order quantity?

(c) If the company operates 250 days a year, the procurement time is 10 days and safety stock is 500 units. Find the reorder level, maximum level, minimum level and average inventory level.

Ans. (a) ₹61,305 (b)₹405 (c) 1,500 units; 6,750 units; 500 units; 3,625 units.

16. Ananya Ltd. produces a product 'Exe' using a raw material Dee. To produce one unit of Exe, 2 kg of Dee is required. As per the sales forecast conducted by the company, it will able to sale 10,000 units of Exe in the coming year. The following is the information regarding the raw materials: **[RTP – May 2019]**

(i) The Re-order quantity is 200 kg. less than the Economic Order Quantity (EOQ).

(ii) Maximum consumption per day is 20 kg. more than the average consumption per day.

(iii) There is an opening stock of 1,000 kg.

(iv) Time required to get the raw materials from the suppliers is 4 to 8 days.

(v) The purchase price is ₹125 per kg.

There is an opening stock of 900 units of the finished product Exe.

The rate of interest charged by bank on Cash Credit facility is 13.76%.

To place an order company has to incur ₹720 on paper and documentation work.

From the above information find out the followings in relation to raw material:

(a) Re-order Quantity

(b) Maximum Stock level

(c) Minimum Stock level

(d) Calculate the impact on the profitability of the company by not ordering the EOQ.

[Take 364 days for a year]

Ans. (a) 1,000 kg; (b) 1,440 kg; (c) 260 kg; (d) ₹440.

17. SK Ltd. supplies surgical gloves to nursing homes and polyclinics in the city. These surgical gloves are sold in pack of 10 pairs at price of ₹250 per pack. **[RTP – May 2018]**

For the month of November 2018, it has been anticipated that a demand for 60,000 packs of surgical gloves will arise. SK Ltd. purchases these gloves from the manufacturer at ₹228 per pack within a 4 to 6 days lead time. The ordering and related cost is ₹240 per order. The storage cost is 10% p.a. of average inventory investment.

Required:

(a) Calculated the Economic Order Quantity (EOQ)

(b) Calculate the number of orders needed every year

(c) Calculate the total cost of ordering and storage of the surgical gloves.

(d) Determine when should the next order to be placed. (Assuming that the company does not maintain a safety stock and that the present inventory level is 10,033 packs with a year of 360 working days).

Ans. (a) 3,893 packets; (b) 185 orders; (c) ₹88,780; (d) Immediately.

18. SK, a small scale manufacturer, produces a product S by using two raw materials K and M in the ratio of 3:2. Material K is perishable in nature and if not used within 5 days of purchase it becomes obsolete. Material M is durable in nature and can be used even after one year. The company has estimated a sales volume of 30,000 kg. for the month of October and expects that the trend will continue for the entire year. The ratio of input and output is 5:3. The purchase price of per kilogram of raw material K and M is ₹15 and ₹22 respectively exclusive of taxes. Material K can be purchased from the local market within I to 2 days period. On the other hand, Material M is purchased from neighbouring state and it takes 2 to 4 days to receive the material in the store.

To place an order the company has to incur an administrative cost of ₹120. Carrying cost for Material K and M is 15% and 5% respectively.

At present Material K is purchased in a lot of 8,000 kg. to avail 10% discount on market price. SGST & CGST applicable for material K is 4% (credit available) and IGST on Material M is 2% (credit not available). Company works for 25 days in a month and production is carried out evenly. **[Similar RTP -May 2024]**

You are required to calculate:

(a) Economic Order Quantity (EOQ) for each material;

(b) Maximum stock level for Material K;

(c) Calculate saving/loss in Material K if purchase quantity equals to EOQ.

Ans. (a) 6,197 kg; 71,65 kg; (b) 6,000 kg; (c) ₹9,03,828

19. A company has the option to procure a particular material from two sources:

Source I – assures that defectives will not be more than 2% of supplied quantity

Source II does not give any assurance, but on the basis of past experience of supplies received, it is observed that defective percentage is 2.8%

The material is supplied in lots of 1,000. Source II supplies the lot at a price, which is lower by ₹100 as compared to Source I. The defective units of material can be rectified for use at a cost of ₹5 per unit. You are required to find out which of the two source is more economical.

Ans. Source-II

20. MM Ltd. has provided the following information about the items in its inventory. **[July 2021]**

Item Code Number	Units	Unit Cost (₹)
101	25	50
102	300	01

103	50	80
104	75	08
105	225	02
106	75	12

MM ltd. has adopted the policy of classifying the items constituting 15% or above to Total Inventory Cost as "A" category, items constituting 6% or less of Total Inventory Cost as "C" category and the remaining items as "B" category.

You are required to:

(i) Rank the items on the basis of % of Total Inventory Cost.

(ii) Classify the items into A, B and C categories as per ABC analysis of Inventory Control adopted by MM Ltd.

Ans. (i) II; VI; I; IV; V; III; (ii) A; C; A; B; C; B

21. Compute the materials turnover ratio for materials S and K and comment upon the results.

	Material S	**Material K**
Opening stock	25,000	87,500
Purchases during the year	1,90,000	1,25,000
Closing stock	15,000	62,500

Ans. 10 times; 2 times

22. The following data are available in respect of material X for the year ended 31st March, 2021.

Opening stock	₹90,000
Purchases during the year	₹2,70,000
Closing stock	₹1,10,000

Calculate:

(i) Inventory turnover ratio, and

(ii) The number of days for which the average inventory is held.

Ans. (i) 2.5 times; (ii) 146 days

23. Raw material 'S' costing ₹150 per kg and 'K' costing ₹90 per kg are mixed in equal proportions for making product 'M'. The loss of material in processing works out to 25% of the product. The production expenses are allocated at 40% of direct material cost. The end product is priced with a margin of 20% over the total cost.

Material 'K is not easily available and substitute raw material 'P' has been found for 'K' costing ₹75 per kg. It is required to keep the proportion of this substitute material in the mixture as low as possible and at the same time maintain the selling price of the end product at existing level and ensure the same quantum of profit as at present.

You are required to compute the ratio of the mix of the raw material 'S' and 'P'.

Ans. 3:2

24. At what price per unit would S entered in the stores ledger, if the following invoice was received from a supplier? **[SM]**

Invoice	₹
200 units S @ ₹5	1,000
Less: 20% discount	200
	800
Add: IGST @ 12%	96
	896
Add: Packing charges (non-returnable boxes)	50
	946

Notes: (a) A 2% discount will be given for payment in 30 days
(b) Documents for claiming input credit are available.

Ans. ₹4.25

25. SK Ltd., not registered under GST, purchased material S from a company which is registered under GST. The following information is available for the one lot of 1,000 units of material purchased:

[RTP – May 2022]

List price of one lot	₹50,000
Trade discount	@10% on listed price
CGST and SGST (Credit not available)	@12% (CGST 6% & SGST 6%)
Cash discount	@10%
(will be given only if payment is made within 30 days)	
Freight and Insurance	₹3,400
Toll tax paid	₹1,000
Demurrage	₹1,000
Commission on brokerage on purchases	₹2,000
Amount deposited for returnable containers	₹6,000
Amount of refund on returning containers	₹4,000
Other expenses	@2% of total cost

20% of material shortage is due to normal reasons.
The payment to the supplier was made within 20 days of the purchases
You are required to calculate cost per unit of material purchased to SK Ltd.

Ans. ₹75

26. A manufacturer of Surat purchased three chemicals S, K and M from Delhi. The invoice provides the following information:

	₹
Chemical S : 3,000 kg at ₹4.20 per kg	12,600
Chemical K : 5,000 kg at ₹3.80 per kg	19,000
Chemical M : 2,000 kg at ₹4.75 per kg	9,500
CGST & SGST	2,055
Railways freight	1,000
Total cost	44,155

A shortage of 200 kg in chemical S, 280 kg in chemical K and 100 kg in chemical M was noticed due to normal breakages. The manufacturer paid cartage of ₹22 for chemical S, ₹63 for chemical K and ₹32 for chemical M. Calculate the stock rate that you suggest for pricing issue of chemicals assuming a provision of 5% towards further deterioration.

Ans. ₹5.09**;** ₹4.57**;** ₹5.65

27. SK Ltd. has projected the following for a product S.

Annual Requirement	10,400 units
Economic Order Quantity	1,040 units
Expected usage per week	200 units
Re-order period	2 weeks

The probability distribution of usage of S over a two week period is as follows:

Usage (Units)	150	250	310	400	460	500	560
Probability	0.05	0.05	0.10	0.50	0.10	0.15	0.05

The stock out cost is ₹4 per unit and carrying cost of ₹5.2 per unit per annum. Calculate Safety Stock and Re-order point.

Ans. Safety stock 100 units and ROL 500 units.

28. SK Ltd. uses a small casting in one of its finished products. The castings are purchased from a foundry. SK limited purchases 54,000 castings per year at a cost of ₹800 per casting. The castings are used evenly throughout the year in the production process on a 360 day per year basis. The company estimates that it costs ₹9,000 to place a single purchase order and about ₹300 to carry one casting in inventory for a year. The high carrying costs results from the need to keep the castings in carefully controlled temperature and humidity conditions, and from the high cost of insurance. **[SM]**

Delivery from the foundry generally takes 6 days, but it can take as much as 10 days. The days of delivery time and percentage of their occurrence are shown in the following tabulation.

Delivery time (days):	6	7	8	9	10
Percentage of occurrence:	75	10	5	5	5

Required:

(a) Compute the economic order quantity (EOQ)

(b) Assume the company is willing to assume a 15% risk of being out of stock. What would be the safety stock? The re-order point?

(c) Assume the company is willing to assume a 5% risk of being out of stock. What would be the safety stock? The re-order point?

(d) Assume 5% stock-out risk. What would be the total cost of ordering and carrying inventory for one year?

(e) Refer to the original data. Assume that using process re-engineering the company reduces its cost of placing a purchase order to only ₹600. In addition, company estimates that when the waste and inefficiency caused by inventories are considered, the true costs of carrying a unit in stock is ₹720 per year.

(i) Compute the new EOQ

(ii) How frequently would the company be placing an order, as compared to the old purchasing policy?

Ans. (a) 1,800 units; (b) 150 units; 1,050 units; (c) 450 units; 1,350 units; (d) ₹6,75,000; (e) (i) 300 units; (ii) 12 days; 2 days.

29. From the following data, prepare store ledger for the month of April using (a) FIFO; (b) LIFO; (c) Weighted Average;

1 April	Opening balance	50 units @ ₹2
3 April	Receipt No. 6	30 units @ ₹3
4 April	Issues	40 units
5 April	Returned to store by production department from issue of 4.4.2012	5 units
6 April	Receipt No. 8	20 units @ ₹4
7 April	Receipt No. 9	50 units @ ₹5
9 April	Issues	40 units
13 April	Issues	40 units
16 April	Returned to vendor from goods purchased on 7.4.2012	5 units
18 April	Transferred from Job 182 to 187	19 units
20 April	Receipt No. 10	30 units @ ₹6
25 April	Issues	20 units

The stock verifier of the company reported a shortage of 10 units on 15th April and 10 units on 30th April.

30 SK Appliances manufactures electronic home appliances. It follows weighted average cost method for inventory valuation. Following are the data of component S: **[RTP May 2020]**

Date	Particulars	Units	Rate per unit (₹)
15 Dec	Purchase Order – 002	10,000	9,930
30 Dec	Purchase Order – 003	10,000	9,780
01 Jan	Opening stock	3,500	9,810
05 Jan	GRN*-002 (against Purchase Order – 002)	10,000	-
05 Jan	MRN**-001 (against the Purchase Order – 002)	500	-
06 Jan	Material Requisition – 005	3,000	-
07 Jan	Purchase Order – 004	10,000	9,750
10 Jan	Material Requisition – 006	4,500	-
12 Jan	GRN-003 (against the Purchase Order – 003)	10,000	-
12 Jan	MRN-002 (against the Purchase Order – 003)	400	-
15 Jan	Material Requisition – 007	2,200	-
24 Jan	Material Requisition – 008	1,500	-
25 Jan	GRN-004 (against the Purchase Order – 004)	10,000	-
28 Jan	Material Requisition – 009	4,000	-
31 Jan	Material Requisition – 010	3,200	-

*GRN – Goods Received Note; **MRN – Material Returned Note

Based on the above data, you are required to Calculate:

(a) RE-order level

(b) Maximum stock level

(c) Minimum stock level

(d) Prepare store ledger for the period January and determine the value of stock as on 31 Jan.

(e) Value of components used during the month of January.

(f) Inventory turnover ratio.

Ans. (a) 94,500 units; (b) 85,000 units; (c) 43,500 units; (d) ₹1,39,001; (e) ₹1,81,061; (f) 2.09 times

31. A Limited has furnished the following information for the months from 1st January to 30th April, 2023: **[May 2023]**

	January	February	March	April
Number of working days	25	24	26	25
Production (in units) per working day	50	55	60	52
Raw material purchases (% by weights to total of 4 months)	21%	26%	30%	23%
Purchase price of raw material (per kg)	₹10	₹12	₹13	₹11

Quantity of raw material per unit of product: 4 kg
Opening stock of raw material on 1st January: 6,020 kg (Cost ₹63,210)
Closing stock of raw material on 30th April: 5,100 kg
All the purchases of material are made at the start of each month.
Required:

(i) Calculate the consumption of raw materials (in kgs) month by month and in total

(ii) Calculate the month-wise quantity and value of raw materials purchased.

(iii) Prepare the priced stores ledger for each month using the FIFO method.

Ans. (i) 5,000; 5,280; 6,240; 5,200; 21,720; (ii) ₹43,680; ₹64,896; ₹81,120; ₹52,624; (iii) ₹56,732

PRACTICE QUESTIONS

32. A Ltd. a toy company purchases its requirement of raw material from S Limited at ₹120 per kg. The company incurs a handling cost of ₹400 plus freight of ₹350 per order. The incremental carrying cost of inventory of raw material is ₹0.25 per kg per month. In addition, the cost of working capital finance on the investment in inventory of raw material is ₹15 per kg per annum. The annual production of the toys is 60,000 units and 5 units of toys are obtained from one kg of raw material. **[May 2022]**

Required:

(i) Calculate the Economic Order Quantity (EOQ) of raw materials.

(ii) Advise, how frequently company should order to minimize its procurement cost. Assume 360 days in a year.

(iii) Calculate the total ordering cost and total inventory carrying cost per annum as per EOQ.

Ans. (i) 1,000 kg; (ii) 30 days; (iii) ₹18,000

33. (a) SK Ltd. has received an offer of quantity discounts on its order of materials as under:

Price per ton (₹)	Ton (Nos.)
1,200	Less than 500
1,180	500 and less than 1,000

1,160	1,000 and less than 2,000
1,140	2,000 and less than 3,000
1,120	3,000 and above

The annual requirement for the material is 5,000 tons. The ordering cost per order is ₹1,200 and the stock holding cost is estimated at 20% of material cost per annum. You are required to compute the most economical purchase level.

(b) What will be your answer, if there are no discounts offered and the price per ton is ₹1,500?

Ans. (a) 1,000 units; (b) 200 units

34. The complete Gardner is deciding on the economic order quantity for two brands of lawn fertilizer: SK and PM. The following information is collected: **[SM]**

Fertilizer	SK	PM
Annual Demand	2,000 Bags	1,280 Bags
Relevant ordering cost per purchase order	₹1,200	₹1,400
Annual relevant carrying cost per bag	₹480	₹560

Required:

(a) Compute EOQ for SK and PM.

(b) For the EOQ, what is the sum of the total annual relevant ordering costs and total annual relevant carrying costs for SK and PM.

(c) For the EOQ compute the number of deliveries per year for SK and PM.

Ans. (i) 100 bags; 80 bags; (ii) ₹48,000; ₹44,800; (iii) 20 orders; 16 orders]

35. M/s X Private Limited is manufacturing a special product which requires a component "SKY BLUE". The following particulars are collected for the year ended 31st March, 2018: **[May 2018]**

Annual demand of "SKY BLUE"	12,000 units
Cost of placing an order	₹1,800
Cost per unit of "SKY BLUE"	₹640
Carrying cost per annum	18.75%

The company has been offered a quantity discount of 5% on the purchase of "SKY BLUE", provided the order size is 3,000 components at a time.

Required:

(*a*) Compute the economic order quantity

(*b*) Advise whether the quantity discount offer can be accepted

Ans. (a) 600 units; (b) Accept the offer

36. Surekha Limited Produces 4,000 litres of paints on a quarterly basis. Each litre requires 2 kg of raw material. The cost of placing one order for raw material is ₹40 and the purchasing price of raw material is ₹50 per kg. The storage cost and interest cost is 2% and 6% per annum respectively. The lead time for procurement of raw material is 15 days. Calculate Economic Order Quantity and Total Annual Inventory Cost in respect of the above raw material. **[Nov 2019]**

Ans. ₹16,03,200

37. SK Ltd. buys its annual requirement of 36,000 units in 6 instalments. Each unit costs ₹1 and the ordering cost is ₹25. The inventory carrying cost is estimated at 20% of unit value. Find the total annual cost of the existing inventory policy. Calculate, how much money can be saved by economic order quantity? **[SM]**

Ans. ₹750; ₹150

38. An automobile company purchases 27,000 spare parts for its annual requirements. The cost per order is ₹240 and the annual carrying cost of average inventory is 12.5%. Each spare part costs ₹50. **[Nov 2020]**

At present, the order size is 3,000 spare parts.

(Assume that number of days in a year = 360 days)

Find out:

(i) How much the company's cost would be saved by opting EOQ model?

(ii) The Re-order point under EOQ model if lead time is 12 days.

(iii) How frequently should orders for procurement be placed under EOQ model?

Ans. (i) ₹2,475; (ii) 900 units; (iii) 18.94 days

39. SK Ltd. produces a product which has a monthly demand of 4,000 units. The product requires a component X which is purchased at ₹20. For every finished product, one unit of component is required. The ordering cost is ₹120 per order and the holding cost is 10% p.a. **[SM]**

You are required to calculate:

(i) Economic order quantity

(ii) If the minimum lot size to be supplied is 4,000 units, what is the extra cost, the company has to incur?

(iii) What is the minimum carrying cost, the company has to incur?

Ans. (i) 2,400 units; (ii) ₹640; (iii) ₹2,400

40. The annual demand for an item of raw material is 4,000 units and the purchase price is expected to be ₹90 per unit. The incremental cost of processing an order is ₹135 and the annual cost of storage is estimated to be ₹12 per unit. Compute the optimal order quantity and total relevant cost of this order quantity? **[MTP – Nov 2018]**

Suppose that ₹135 as estimated to be the incremental cost of processing an order is incorrect and should have been ₹80. All other estimates are correct. Estimate the difference in cost on account of this error?

Assume at the commencement of the period that a supplier offers 4,000 units at a price of ₹86. The materials will be delivered immediately and placed in the stores. Assume that the incremental cost of placing the order is zero and original estimate of ₹135 for placing an order for the economic batch is correct. Analyze, should the order be accepted?

Ans. Cost of error = ₹94; Not to accept the offer

41. A company uses three raw materials A, B and C for a particular product for which the following data apply: **[SM]**

Raw Material	Usage per unit (Kg)	Reorder Quantity (Kg)	Price per Kg (₹)	Min	Delivery period Average	Max	Reorder level (Kg)	Minimum level (Kg)
A	10	10,000	0.10	1	2	3	8,000	
B	4	5,000	0.30	3	4	5	4,750	
C	6	10,000	0.15	2	3	4		2,000

Weekly production varies from 175 to 225 units, averaging 200 units of the said product. What would be the following quantities:

(a) Minimum stock of A?
(b) Maximum stock of B?
(c) Re-order level C?
(d) Average stock level of A?

Ans. (a) 4,000 kg; (b) 7,650 kg; (c) 5,400 kg; (d) 9,000 kg

42. A company uses four raw materials A, B, C and D for a particular product for which the following data apply:- **[RTP – Nov 2020]**

Raw Material	Usage per unit of product (Kg)	Re-order Quantity (Kg)	Price per Kg (₹)	Delivery period (in weeks)			Re-order level (Kg)	Minimum level (Kg)
				Minimum	Average	Maximum		
A	12	12,000	12	2	3	4	60,000	?
B	8	8,000	22	5	6	7	70,000	?
C	6	10,000	18	3	5	7	?	25,500
D	5	9,000	20	1	2	3	?	?

Weekly production varies from 550 to 1,250 units, averaging 900 units of the said product. What would be the following quantities:

(i) Minimum Stock of A?
(ii) Maximum Stock of B?
(iii) Re-order level of C?
(iv) Average stock level of A?
(v) Re-order level of D?
(vi) Minimum Stock level of D?

Ans. (i) 27,600 kg; (ii) 56,000 kg; (iii) 52,500 kg; (iv) 33,600 kg; (v) 18,750 kg; (vi) 9,750 kg

43. SK Ltd. is the manufacturer of monitor for PCs. A monitor requires 4 units of Part-S. The following are the details of this operation during 2020: **[RTP – Nov 2018]**

Average monthly market demand	2,000 Monitors
Ordering cost	₹1,000 per order
Inventory carrying cost	20% per annum

Cost of Part	₹350 per part
Normal usage	425 parts per week
Minimum usage	140 parts per week
Maximum usage	710 parts per week
Lead time to supply	3-5 weeks

Compute from the above:

(a) Economic order quantity (EOQ). If the supplier is willing to supply quarterly 30,000 units of Part-S at a discount of 5%, is it worth accepting?

(b) Re-order level

(c) Maximum level of stock

(d) Minimum level of stock

Ans. (a) 1,656 units; Accept; (b) 3,550 units; (c) 4,786 units; (d) 1,850 units

44. MM Ltd. uses 7500 valves per month which is purchased at a price of ₹1.50 per unit. The carrying cost is estimated to be 20% of average inventory investment on an annual basis. The cost to place an order and getting the delivery is ₹15. It takes a period of 1.5 months to receive a delivery from the date of placing an order and a safety stock of 3,200 valves is desired. **[Nov 2022]**

You are required to determine:

(i) The Ecomic Order Quantity (EOQ) and the frequent orders.

(ii) The re-order point

(iii) The Economic Order Quantity (EOQ) if the valve cost ₹4.50 each instead of 1.50 each.

(Assume a year consist of 360 days)

Ans. (i) 3,000 valves; 12 days; (ii) 14,450 valves; (iii) 1,732 valves

45. ACE Ltd. produces a product EMM using a material 'REX'. To produce one unit of EMM 0.80 kg of 'REX' is required. As per the sales forecast conducted by the company it will be able to sell 45,600 units of product EMM in the coming year. There is an opening stock of 3,150 units of product EMM and company desires to maintain closing stock equal to one month's forecasted sale. Following is the information regarding material 'REX'. **[May 2019]**

Purchase price per kg	₹25
Cost of placing order	₹240 per order
Storage cost	2% per annum
Interest rate	10% per annum
Average lead time	8 days
Difference between minimum and maximum lead time	6 days
Maximum usage	150 kg
Minimum usage	90 kg

Opening stock of material 'REX' is 2,100 kg and closing stock will be 10% more than opening stock. Required:

(i) Compute the EOQ and total cost as per EOQ

(ii) Compute the reorder level and maximum level

(iii) If the company places an order of 7,500 kg of REX at a time, it gets 2% discount, should the offer be accepted?

Ans. (i) 2,440 kg; ₹9,37,750; (ii) 1,650 kg; 3,640 kg; (iii) Accept the offer

46. The yearly production of a company's product which has a steady market is 40,000 units. Each unit of a product requires 1 kg of raw material. The cost of placing one order for raw material is ₹1,000 and the inventory carrying cost is ₹20 per annum. The lead time for procurement of raw material is 36 days and a safety stock of 1,000 kg of raw materials is maintained by the company. The company has been able to negotiate the following discount structure with the raw material supplier: **[MTP – Nov 2021]**

Order Quantity (kgs)	Discount (₹)
Upto 6,000	Nil
6,000 – 8,000	4,000
8,000 – 16,000	20,000
16,000 – 30,000	32,000
30,000 – 45,000	40,000

You are required to:

(a) Calculate the re-order point taking 30 days in a month

(b) Prepare a statement showing the total cost of procurement and storage of raw materials after considering the discount if the company elects to place one, two, four or five orders in the year.

(c) State the number of orders which the company should place to minimize the costs after taking EOQ also into consideration.

Ans. (a) 5,000 kg; (b) ₹3,61,000; ₹1,70,000; ₹84,000; ₹81,000; (c) 20 orders

47. M/s SJ Private Limited manufactures 20,000 units of a product per month. The cost of placing an order is ₹1,500. The purchase price of the raw material is ₹100 per kg. The re-order period is 5 to 7 weeks. The consumption of raw materials varies from 200 kg to 300 kg per week, the average consumption being 250 kg. The carrying cost of inventory is 9.75% per annum. **[Nov 2018]**

You are required to calculate:

(i) Re-order quantity

(ii) Re-order level

(iii) Maximum level

(iv) Minimum level

(v) Average stock level

Ans. (i) 2,000 kg; (ii) 2,100 kg; (iii) 3,100 kg; (iv) 600 kg; (v) 1,850 kg

48. M/s Tanishka Materials Private Limited produces a product which names "ESS". The consumption of raw material for the production of "ESS" is 210 kgs to 350 kgs per week. Other information is as follows: **[RTP – Nov 2022]**

Procurement time	5 to 9 days
Purchase price of raw material	₹100 per kg

Ordering cost per order	₹200
Storage cost	1% per month plus ₹2 per unit per annum

Consider 365 days a year:

You are required to calculate:

(a) Economic order quantity

(b) Re-order level

(c) Maximum level

(d) Minimum level

(e) Average stock level

(f) Number of orders to be placed per year

(g) Total inventory cost

(h) If the supplier is willing to offer 1% discount on purchase of total annual quantity in two orders, whether offer is acceptable?

(i) If the answer is no, what should be the counter offer w.r.t. percentage of discount?

Ans. (a) 646 kg; (b) 450 kg; (c) 946 kg; (d) 170 kg; (e) 558 kg; (f) 23 orders; (g) ₹14,69,122; (h) not to accept offer; (i) Discount of at least 2.82%

49. A company produces a product 'AB' by using two raw materials – 'Material Ae' and 'Material Be' in the ratio of 5:3. **[MTP – Nov 22]**

A sales volume of 50,000 kgs is estimated for the month of December by the managers expecting the trend will continue for the entire year. The ratio of input and output is 8:5.

Other information about raw material Ae is as follows:

Purchase price	₹150 per kg
Re-order period	2 to 3 days
Carrying cost	12%

Note: Material Ae is perishable in nature and if not used within 3.5 days of purchase if becomes obsolete.

To place an order for material 'Ae' the company has to incur an administrative cost of ₹375 per order. At present, material 'Ae' is purchased in a lot of 7,500 kgs to avail the discount on purchase. Company works for 25 days in a month and production is carried out evenly.

You are required to calculate:

(a) Economic order quantity (EOQ) for material Ae

(b) Maximum stock level for Material Ae

Ans. (a) 5,000 kg; (b) 7,000 kg

50. From the following details, draw a plan of ABC selective control: **[SM]**

Item	Units	Unit Cost (₹)
1	7,000	5
2	24,000	3
3	1,500	10
4	600	22
5	38,000	1.5

6	40,000	0.5
7	60,000	0.2
8	3,000	3.5
9	300	8
10	29,000	0.4
11	11,500	7.1
12	4,100	6.2

Assume the following basis for selective control:

₹50,000 and above - Category A
₹15,000 to ₹50,000 - Category B
Below ₹15,000 - Category C

Ans. Category A – 11, 2, 5; Category B – 1, 12, 6, 3; Category C – 4, 7, 10, 8, 9

51. A factory uses 4,000 varieties of inventory. In terms of inventory holding and inventory usage, the following information is compiled: **[SM]**

No. of varieties of inventory	%	% value of inventory holding (average)	% of inventory usage (in end-product)
3,875	96.875	20	5
110	2.750	30	10
15	0.375	50	85
4,000	100.00	100	100

Classify the items of inventory as per ABC analysis with reasons.

Ans. C; B; A

52. The following data are available in respect of material X for the year ended 31st March, 2021. **[SM]**

Opening stock ₹90,000
Purchases during the year ₹2,70,000
Closing stock ₹1,10,000

Calculate:

(i) Inventory turnover ratio, and
(ii) The number of days for which the average inventory is held.

Ans. (i) 2.5 times; (ii) 146 days

53. From the following data for the year ended 31st March, calculate the inventory turnover ratio of the two items and put forward your comments on them. **[SM]**

Particulars	Material A(₹)	Material B(₹)
Opening stock	10,000	9,000

Purchases during the year	52,000	27,000
Closing stock	6,000	11,000

Ans. Material A – 7 times; 52 days; Material B – 2.5 times; 146 days

54. XYZ Ltd uses two types of raw materials – 'Material A' and 'Material B' in the production process and has provided the following data for the year ended on 31st March, 2021: **[Dec 2021]**

Particulars	Material A(₹)	Material B(₹)
Opening stock as on 1.04.2020	30,000	32,000
Purchases during the year	90,000	51,000
Closing stock as on 31.02.2021	20,000	14,000

You are required to calculate:

(a) The inventory turnover ratio of 'Material A' and ' Material B'

(b) The number of days for which the average inventory is held for both materials 'A' and 'B'.

(i) Based on above calculations, give your comments.
(Assume 360 days in a year)

Ans. (i) (a) 4 times; 3 times; (b) 90 days; 120 days; (ii) Material A is fast moving]

55. The following details are provided by M/s SKU Enterprises for the year ended 31st March, 2018: **[May 2018]**

Particulars	Material – M (₹)	Material-N (₹)
Stock as on 01-04-2017	6,00,000	10,00,000
Stock as on 31-03-2018	4,50,000	7,25,000
Purchases during the year	9,50,000	18,40,000

You are required to:

(i) Calculate Turnover Ratio of both the materials

(ii) Advise which of the two materials is fast moving. (Assume 360 days in a year)

Ans. (i) 2 times; 2.4 times; (ii) Material N

56. An invoice in respect of a consignment of chemicals A and B provide the following information: **[SM]**

	(₹)
Chemical A: 10,000 kgs at ₹10 per kg	1,00,000
Chemical B: 8,000 kgs at ₹13 per kg	1,04,000
Basic custom duty @10% (credit is not allowed)	20,400
Railway freight	3,840
	2,28,240

A shortage of 500 kg in chemical A and 320 kg in chemical B is noticed due to normal breakages. You are required to compute the rate per kg of each chemical, assuming a provision of 2% for further deterioration.

Ans. ₹12.04; ₹15.43

57. M/s SK Ltd trades in chairs. It stocks sufficient quantity of chairs of almost every variety. In year end, the report of sales manager revealed that M/s SK experienced stock-out of chairs. The stock-out data is as follows: **[SM]**

Stock-out of chairs	No. of times
100	2
80	5
50	10
20	20
10	30
0	33

M/s SK loses ₹150 per unit due to stock-out and spends ₹50 per unit on carrying of inventory. Determine optimum safest stock level.

Ans. 20 units

58. The following are the details of receipt and issue of material 'CXE' in a manufacturing Co. during the month of April 2019: **[May 2019]**

Date	Particulars	Quantity (kg)	Rate per kg
April 4	Purchases	3,000	₹16
April 8	Issue	1,000	
April 15	Purchases	1,500	₹18
April 20	Issue	1,200	
April 25	Return to supplier out of purchase made on April 15	300	
April 26	Issue	1,000	
April 28	Purchase	500	₹17

Opening stock as on 01-04-2019 is 1,000 kg @ ₹15 per kg.
On 30th April, 2019 it was found that 50 kg of material 'CXE' was fraudulently misappropriated by the store assistant and never recovered by the company. Required:

(i) Prepare a store ledger account under each of the following method of pricing the issue:
   (a) Weighted Average Method
   (b) LIFO

(ii) What would be the value of material consumed and value of closing stock as on 30-04-2019 as per these two methods?

59. The following information is provided by SK Ltd. for the fortnight of April, 2022: **[SM]**

Material Exe:
Stock on 1-4-2022, 100 units at ₹5 per unit
Purchases:
5-4-2022, 300 units at ₹6
8-4-2022, 500 units at ₹7

12-4-2022, 600 units at ₹8
Issues:
6-4-2022, 250 units
10-4-2022, 400 units
14-4-2022, 500 units
Required:

(A) Calculate using FIFO and LIFO methods of pricing issues:
   (*a*) the value of materials consumed during the period
   (*b*) the value of stock of materials on 15-4-2022

(B) Explain why the figures in (a) and (b) in part A of this question are different under the two methods of pricing of material issues used. You need not draw up the stores ledger.

60. SK Ltd. is recently incorporated start-up company back in the year 2019. It is engaged in creating embedded products and internet of things ((IoT) solutions for the industrial market. It is focused on innovation, design, research and development of products and services. One of its embedded products is LogMax, a system on module (SoM) Carrier board for industrial use. It is a small, flexible and embedded computer designed as per industry specifications. In the beginning of the month of September 2022, company entered into a job agreement of providing 4,800 LogMax to Nit, Mandi. Following details w.r.t. issues, receipts, returns of store department handling Micro-controller, a component used in the designated assembling process have been extracted for the month of September, 2021: **[SM]**

Sep. 1	Opening stock of 6,000 units at ₹285 per unit
Sep. 8	Issued 4,875 units to mechanical division vide material requestion no. mech 009/20
Sep. 9	Received 17,500 units @ ₹276 per unit vide purchase order no. 159/2020
Sep. 10	Issued 12,000 units to a technical division vide material requisition no. Tech -21/20
Sep. 12	Returned to stores 2375 units by technical division against material requisition no. Tech 021/20
Sep. 15	Received 9,000 units @ ₹288 per units vide purchase order no. 160/2020
Sep. 17	Returned to supplier 700 units out of quantity received vide purchase order no. 160/2020
Sep. 20	Issued 9,500 units to technical division vide material requisition no. Tech 165/20

On 25th September, 2021, the stock manager of the company expressed his need to leave for his hometown due to certain contingency and immediately left the job same day. Later, he also switched his phone off.

As the company has the tendency of stock-taking every end of the month to check and report for the loss due to rusting of the components, the new stock manager, on 30th September, 2021, found that 900 units of Micro-controllers where missing which was apparently misappropriated by the former stock manager. He, further reported loss of 300 units due to rusting of the components.

From the above information, you are required to prepare the stock ledger account using 'Weighted Average' method of valuing the issues.

61. The following transactions in respect of material Y occurred during the six months ended 30th June: **[SM]**

Month	Purchase (units)	Price per unit (₹)	Issued Units
January	200	25	Nil
February	300	24	250
March	425	26	300
April	475	23	550
May	500	25	800
June	600	20	400

Required:

(a) The chief accountant argues that the value of closing stock remains the same no matter which method of pricing of material issues is used. Do you agree? Why or why not? Explain. Detailed stores ledger are not required.

(b) State when and why would you recommend the LIFO method of pricing material issues?

62. The following information is extracted from the stores ledger: **[SM]**

Material X

Opening stock	Nil
Purchases:	
Jan. 1	100 @ ₹1 per unit
Jan. 20	100 @ ₹2 per unit
Issues:	
Jan. 22	60 for Job W16
Jan. 23	60 for Job W 17

Complete the receipts and issues valuation by adopting the First-in-First-Out, Last-in-First-out and the weighted average method. Tabulate the values allocated to Job W16 and W17 and the closing stock under the methods aforesaid.

63. SK Ltd. furnishes the following store transactions for September: **[SM]**

1 Sep	Opening balance	25 units value ₹6.50
4 Sep	Issues Req. No. 85	8 units
6 Sep	Receipts from B & Co. GRN No. 26	50 units @ ₹5.75 per unit
7 Sep	Issues Req. No. 97	12 units
10 Sep	Return to B & Co.	10 units
12 Sep	Issues Req. No. 108	15 units
13 Sep	Issues Req. No. 110	20 units
15 Sep	Receipts from M & Co. GRN No. 33	25 units @ ₹6.10 per unit
17 Sep	Issues Req. No. 121	10 units
19 Sep	Received replacement from B & Co. GRN No. 38	10 units
20 Sep	Returned from department, material of M & CO. MRR No. 4	5 units
22 Sep	Transfer from Job 182 to Job 187 in the dept. MTR 6	5 units

26 Sep	Issues Req. No. 146	10 units
29 Sep	Transfer from Dept. A to Dept. B MTR 10	5 units
30 Sep	Shortage in stock taking	2 units

Write up the priced stores ledger on FIFO method and discuss how would you treat the shortage in stock taking

64. From the following information, calculate the total cost of Product A and B using the ABC Analysis: **[MTP May 2024]**

	Product A	**Product B**
Units	5,000	5,000
Number of purchase order placed	100	220
Number of deliveries received	70	200
Ordering cost	₹4,00,000	
Delivery cost	₹1,35,000	

A. A = ₹47,500; B = ₹1,27,500

B. A = ₹2,67,500; B = ₹2,67,500

C. A = ₹1,60,00; B = ₹3,75,000

D. A = ₹1,47,500; B = ₹1,47,500

Ans. (c)

65. The purchase committee of A Ltd. has been entrusted to review the material procurement policy of the company. The chief marketing manager has appraised the committee that the company at present produces a single product X by using two raw materials A and B in the ratio of 3:2. Material A is perishable in nature and has to be used within 10 days from Goods received note (GRN) date otherwise material becomes obsolete. Material B is durable in nature and can be used even after one year. Material A is purchased from the local market within 1 to 2 days of placing order. Material B, on the other hand, is purchased from neighbouring state and it takes 2 to 4 days to receive the material in the store.

The purchase price of per kilogram of raw material A and B is ₹30 and ₹44 respectively exclusive of taxes. To place an order, the company has to incur an administrative cost of ₹1,200. Carrying cost for Material A and B is 15% and 5% respectively. At present material A is purchased in a lot of 15,000 kg. to avail 10% discount on market price. GST applicable for both the materials is 18% and the input tax credit is availed.

The sales department has provided an estimate that the company could sell 30,000 kg. in January 2024 and also projected the same trend for the entire year.

The ratio of input and output is 5:3. Company works for 25 days in a month and production is carried out evenly.

The following queries/ calculations to be kept ready for purchase committees' reference:

(i) For the month of January 2024, what would be the quantity of the materials to be requisitioned for both material A and B:

(a) 9,000 kg & 6,000 kg respectively (b) 18,000 kg & 12,000 kg respectively

(c) 27,000 kg & 18,000 kg respectively (d) 30,000 kg & 20,000 kg respectively.

(ii) The economic order quantity (EOQ) for both the material A & B:

(a) 13,856 kg & 16,181 kg respectively (b) 16,197 kg & 17,327 kg respectively

(c) 16,181 kg & 17,165 kg respectively (d) 13,197 kg & 17,165 kg respectively

(iii) What would the maximum stock level for material A:

(a) 18,200 kg. (b) 12,000 kg. (c) 16,000 kg. (d) 16,200 kg.

(iv) Calculate saving/ loss in purchase of Material A if the purchase order quantity is equal to EOQ.

(a) Profit of ₹3,21,201. (b) Loss of ₹3,21,201.

(c) Profit of ₹2,52,500. (d) Loss of ₹2,52,500.

(v) What would the minimum stock level for material A:

(a) 1,800 kg. (b) 1,200 kg. (c) 600 kg. (d) 2,400 kg.

Ans. (i)- (d), (ii) - (a), (iii) - (b), (iv) - (ii), (v) - (iii)

SOLUTION OF PRACTICE QUESTIONS

32. (*a*) A = 60,000 ÷ 5 = 12,000 kg, O = 400 + 350 = ₹750, C = 15 + (0.25 × 12) = ₹18

$$EOQ = \sqrt{\frac{2 \times A \times O}{C}} = \sqrt{\frac{2 \times 12,000 \times 750}{18}} = 1,000 \text{ kg}$$

(b) Number of orders to be placed = $\frac{12,000}{1,000}$ = 12 orders

$$\text{Frequency of order} = \frac{360}{\text{No. of orders}} = \frac{360}{12} = 30 \text{ days}$$

(c) Total ordering cost = No. of order × cost per order = 12 × 750 = ₹9,000

$$\text{Total carrying cost} = \frac{\text{Order Size}}{2} \times \text{carrying cost per unit p.a.} = \frac{1,000}{2} \times 18 = ₹\ 9,000$$

Total cost = ₹ 18,000

33. (a) Statement of Cost

Total annual requirement (A)	Order Size (Tonnes) (OS)	Price per tonne (P)	No. of Orders (A,OS= S)	Cost of inventory (PC) (A × P)	Ordering cost (OC) (S × ₹12,00)	Carrying cost (CC) [(OS2) × P]	Total cost (PC + OC + CC)
5,000	400	1,200	12.5 or 13	60,00,000	15,600	48,000	60,63,000
	500	1,180	10	59,00,000	12,000	59,000	59,71,000
	1,000	1,160	5	58,00,000	6,000	1,16,000	59,22,000
	2,000	1,140	2.5 or 3	57,00,000	3,600	2,28,000	59,31,600
	3,000	1,120	1.666 or 2	56,00,000	2,400	3,36,000	59,38,400

From the above table, it can be verified that total cost is lowest in case when the order size is 1,000 units. Thus, most economical purchase level is 1,000 units.

(b) If there is not discounts offered than the order size should be equal to EOQ.

$$EOQ = \sqrt{\frac{2 \times A \times O}{C}} = \sqrt{\frac{2 \times 5,000 \times 1,200}{20\% \times ₹1,500}} = 200 \text{ units}$$

34. (i)

		SK	PM
	A = Annual Requirement	2000 Bags	1280 Bags
	O = Ordering cost per order	₹1200	₹1400
	C = Carrying cost/ unit/annum	₹480	₹560
	$EOQ = \sqrt{\frac{2 \times A \times O}{C}}$	$\sqrt{\frac{2 \times 2,000 \times 1,200}{480}}$ = 100 bags	$\sqrt{\frac{2 \times 1,280 \times 1,400}{560}}$ = 80 bags
(ii)	Ordering cost [(A÷EOQ) × O)	[(2,000,100) × 1200] = ₹24,000	[(1,280÷80) × 1400] = ₹22,400
	Carrying cost [(EOQ,2) × C]	[(100 ÷ 2) × 480] = ₹24,000	[(80 ÷ 2) × 560] = ₹22,400
	Total of ordering and carrying cost	₹24,000 + ₹24,000 = ₹48,000	₹22,400 + ₹22,400 = ₹44,800
(iii)	No. of Deliveries i.e; No. of orders to be placed per year [A÷EOQ]	[2,000 ÷ 100] = 20 orders p.a.	[1,280 ÷ 80] =16 orders p.a.

35. (i) $EQO = \sqrt{\frac{2 \times A \times O}{C}}$

A = 12,000 units

O = ₹1,800

C = ₹640 per unit × 18.75% = ₹120 per unit

$$EOQ = \sqrt{\frac{2 \times 12,000 \times 1,800}{120}} = 600 \text{ units}$$

(ii) Statement showing evaluation of proposal

Particulars	Order 600 units	Order 3,000 units
Annual purchase cost (₹640/608 p.u)	76,80,000	72,96,000
Annual Ordering cost (₹1,800 per order)	36,000	7,200
Annual carrying cost (₹120/114 per unit)	36,000	1,71,000
Total Cost	₹77,52,000	₹74,74,200

Since the total cost is lower by ₹2,77,800 in case when the company gets the discount offer of 5%, thus, it is recommended to accept the discount offer with order size of 3,000 units.

36. A = 4,000 × 2 × 4 = 32,000 kg

O = ₹40

C = 50 × (2% + 6%) = ₹4

$$EOQ = \sqrt{\frac{2 \times A \times O}{C}} = \sqrt{\frac{2 \times 32{,}000 \times 40}{4}} = 800 \text{ kg}$$

Total inventory cost = Purchase cost + Ordering cost + Carrying cost

$$= (32{,}000 \times 50) + \left(\frac{32{,}000}{800} \times 40\right) + \left(\frac{800}{2} \times 4\right) = ₹16{,}03{,}200$$

37. (*a*) Total ordering cost = 6 orders × ₹25 = ₹150

Total carrying cost = $\frac{36{,}000}{6} \times \frac{1}{2} \times 20\% \times 1$ = ₹600

Total Cost ₹750

(*b*) $EOQ = \sqrt{\frac{2 \times 36{,}000 \times 25}{20\% \times 1}}$ = 3,000 units

Total ordering cost = $\frac{36{,}000}{3{,}000} \times ₹25$ = ₹300

Total carrying cost = $3{,}000 \times \frac{1}{2} \times 20\% \times 1$ = ₹300

Total Cost = ₹600

Saving due to EOQ = ₹750 – ₹600 = ₹150

38. (i) Annual requirement (A) = 27,000

Cost per order (O) = ₹240

Carrying cost per unit p.a. (C) = 50 × 12.5% = ₹6.25

$$EOQ = \sqrt{\frac{2 \times A \times O}{C}} = \sqrt{\frac{2 \times 27{,}000 \times 240}{6.25}} = 1{,}440 \text{ units}$$

Statement of Cost

Particulars	Order size = 3,000	Order size = 1,440
Purchase cost	27,000 × 50 = 13,50,000	27,000 × 50 = 13,50,000
Ordering cost	$\frac{27{,}000}{3{,}000} \times 240$ = 2,160	$\frac{27{,}000}{1{,}440}$ or 18.75 or 19×240 = 4,560
Carrying cost	$\frac{3{,}000}{2} \times 6.25$ = 9,375	$\frac{1{,}440}{2} \times 6.25$ = 4,500
Total cost	**13,61,535**	**13,59,060**

Saving due to EOQ = ₹13,61,535 – ₹13,59,060 = ₹2,475

(ii) Re-order point = Maximum consumption × Maximum time = $\frac{27,000}{360}$ × 12 = 900 units

(iii) Number of orders under EOQ Model = $\frac{27,000}{1,440}$ = 18.75 or 19

Frequency of order = $\frac{360}{19}$ = 18.94 days

39. (i) EQO = $\sqrt{\frac{2\times A\times O}{C}}$

A = 4000 × 12 = 48000 units

O = ₹120 per order

C = 20 × 10% = ₹2 per order per annum

EOQ = $\sqrt{\frac{2\times 4,800\times 240}{2}}$ = 2400 units

(ii) Statement Showing Determination of various cost

	Order 2400 units	Order 4000 units
Annual Ordering cost $\left(\frac{48,000}{2,400}120\right)\left(\frac{4,8000}{4,000}120\right)$	2,400	1,440
Annual Carrying cost $\left(\frac{2,400}{2}2\right)\left(\frac{4,000}{2}2\right)$	2,400	4,000
Total Cost	**4,800**	**5,440**

Extra Cost includes = ₹(5550 – 4800) = ₹640

(iii) Minimum Carrying Cost = ₹2,400 which is possible at 2,400 units (EOQ)

40. EOQ = $\sqrt{\frac{2\times A\times O}{C}}$ = $\sqrt{\frac{2\times 4,000\times 135}{12}}$ = 300 units

Number of orders= $\frac{4000}{3000}$ = 13.33 or 14 orders

Relevant cost of this order quantity:

Ordering cost [14 × 135]	1,890
Carrying cost [(300 ÷ 2) × 12]	1,800
Relevant cost	3,690

Revised EOQ = $\sqrt{\frac{2\times A\times O}{C}}$ = $\sqrt{\frac{2\times 4,000\times 80}{12}}$ = 231 units

'Number of orders= 4000/231= 17.31 or 18

Statement of cost

Particulars	OS = 300	OS = 231
Ordering Cost	140 × 80 = 1120	18 × 80 = 1440
Carrying Cost	(300/2) × 12 = 1800	(231/2) × 12 = 1386
Total	2920	2826

Difference in cost on account of this error = 2920 – 2826 = 94

Statement of Evaluation of Offer

Costs	Order Size = 300	Order Size = 4,000
Purchase Cost	4,000 × 90 = 3,60,000	4,000 × 86 = 3,44,000
Ordering Cost	14 × 135 = 1,890	$\frac{4,000}{4,000} \times 0 = 0$
Carrying Cost	$\frac{300}{2} \times 12 = 1,800$	$\frac{4,000}{2} \times 12 = 24,000$
Total Cost	3,63,690	3,68,000

This special offer at ₹86 per unit should not be accepted as its total cost is higher as compared to original offer.

41. (a) Minimum stock of A = ROL – (Average lead time × Average consumption)
= 8,000 – (2 × 200 × 10) = 4,000 kg

(b) Maximum stock of B = ROL + ROQ – (Min. lead time × Min. consumption)
= 4,750 + 5,000 – (3 × 175 × 4) = 7,650 kg

(c) Re-order level of C = Max. lead time × Max. consumption
= 4 × 225 × 6 = 5,400 kg

(d) Average level of A = Minimum level + $\frac{ROQ}{2}$ = 4,000 + $\frac{10,000}{2}$ = 9,000 kg

42. (i) Minimum stock of A = Re-order level – (Avg. consumption × Avg. delivery time)
= 60,000 – (900 × 12 × 3) = 27,600 kg

(ii) Maximum stock of B = Re-order level + Re-order quantity – (Min. consumption × Min. time)
= 70,000 + 8,000 – (550 × 8 × 5) = 56,000 kg

(iii) Re-order level of C = Maximum consumption × Maximum delivery time
= (1,250 × 6) × 7 = 52,500 kg

(iv) Average stock of A = Minimum stock + $\frac{\text{Re-order Quantity}}{2}$

= 27,600 + $\frac{12,000}{2}$ = 33,600 kg

(v) Re-order level of D = Maximum consumption × Maximum time
= (1,250 × 5) × 3 = 18,750 kg

(vi) Minimum stock of D = Re-order level – (Avg. consumption × Avg. time)
= 18,750 – (900 × 5 × 2) = 9,750 kg

43. (*a*) A = Annual usage of parts = 2,000 × 4 × 12 = 96,000 units
O = Cost per order = ₹1,000
C = Carrying cost per unit per annum = 350 × 20% = ₹70
EOQ = 1,656 parts (approx.)
The supplier is willing to supply 30,000 units at a discount of 5%, therefore cost of each part shall be ₹350 – 5% = ₹332.50

Statement of Evaluation of Offer

Particulars	Order 30,000 units	Order 1,656 units
Annual Purchase Cost	96,000 × 332.5= 3,19,20,000	96,000 × 350 = 3,36,00,000
Annual Ordering Cost	$\frac{96,000}{30,000}$ or $4 \times 1,000$ = 4,000	$\frac{96,000}{1,656}$ or $58 \times 1,000$ = 58,000
Annual Carrying Cost	$\frac{30,000}{2} \times 332.5 \times 20\%$ = 9,97,500	$\frac{1,656}{2} \times 350 \times 20\%$ = 57,960
Total Cost	**3,29,21,500**	**3,37,15,960**

Since the total cost under the supply of 30,000 units with 5% discount is lower than that when order size is 1,656 units, therefore the offer should be accepted.

(b) Re-order level = Maximum consumption × Maximum re-order period
= 710 × 5 = 3,550 units

(c) Maximum level = ROL + ROQ – (Minimum consumption × Minimum re-order period)
= 3,550 + 1,656 – (140 × 3 = 4,786 units

(d) Minimum level = ROL – (Normal consumption × Normal re-order period)
= 3,550 – (425 × 4) = 1,850 units

44. (i) A = 7,500 × 12 = 90,000 valves
O = ₹15
C = 20% × 1.50 = ₹0.30

$$\text{EOQ} = \sqrt{\frac{2 \times A \times O}{C}} = \sqrt{\frac{2 \times 90,000 \times 15}{0.30}} = 3,000 \text{ valves}$$

Number of orders = 90,000 ÷ 3,000 = 30 orders
Frequency of order = 360 ÷ 30 = 12 days.

(ii) Re-order Quantity = Safety stock + (Average consumption × Average lead time)
= 3,200 + (7,500 × 1.5) = 14,450 valves

(iii) New carrying cost (C) = 20% × 4.50 = ₹0.90

$$\text{EOQ} = \sqrt{\frac{2 \times A \times O}{C}} = \sqrt{\frac{2 \times 96,000 \times 1,000}{70}} = 1,732 \text{ valves}$$

Working Notes:

45. (1) Production units of EMM = Sales + Closing stock – Opening stock

$$= 45{,}600 + \frac{45{,}600}{12} - 3{,}150 = 46{,}250 \text{ units}$$

(2) Quantity of REX required to produce 1 unit of EMM 0.80 kg

Quantity of REX required to produce 46,250 units of EMM 37,000 kg

Purchase units of REX = Consumption + Closing stock – opening stock

= 37,000 + 2,310 – 2,100 = 37,210 kg

(3) Maximum lead time – Minimum lead time = 6

Max. lead time = 6 + Minimum lead time

Also, Average lead time = $\frac{\text{Minimum lead time+Maximum lead time}}{2}$

$8 = \frac{\text{Min. lead time+ 6 +Min. lead time}}{2}$

16 = 2(Min. lead time) + 6

Min. lead time = 5 days

∴ Max. lead time = 6 + 5 = 11 days

(i) **Computation of EOQ**

A = 37,210 kg

O = ₹240

C = (10% + 2%) × 25 = 12% × 25 = ₹3

$EOQ = \sqrt{\frac{2 \times A \times O}{C}} = \sqrt{\frac{2 \times 37{,}210 \times 240}{3}} = 2{,}440$ kg

Number of orders = 37210/2440 = 15.25 or 16

Total cost at EOQ = Purchase cost + Ordering cost + Carrying cost

$$= (37{,}210 \times 25) + (16 \times 240) + \left(\frac{2{,}440}{2} \times 3\right) = ₹9{,}37{,}750$$

(ii) Reorder level = Maximum usage × Maximum lead time = 150 kg × 11 days = 1,650 kg

Maximum level = Reorder level + Reorder Quantity – (Min. usage × Min. lead time)

= 1,650 + 2,440 – (90 × 5) = 3,640 kg

(iii) New Purchase price after 2% discount = 25 – 2% = ₹24.50

Number of orders = 37210/7500 = 4.96 or 5

Total cost at order size of 7,500 kg = Purchase cost + Ordering cost + Carrying cost

$$= (37{,}210 \times 24.50) + (5 \times 240) + \left(\frac{7{,}500}{2} \times 12\% \times 24.50\right) = ₹9{,}23{,}870$$

With order size of 7,500 kg, company can save ₹13,880, ₹9,37,750, ₹9,23,870. Thus, it is recommended to accept the offer.

46. (i) Annual Production = 40,000 units

Annual Consumption of Raw Material = (40,000 units × 1 kg) = 40,000 kg

Reorder point = Safety Stock Level + Normal Usages × Normal Lead Time

= 1,000 kg + 4,000= 5,000 kg

(ii) Statement showing determination of EOQ

Annual Requirement (kg)	No. of Orders P.a	Size of Order (kg)	Avg. Units (kg)	Annual Ordering Cost(₹) (A)	Annual Carrying Cost(₹) (B)	Annual Discount (₹) (C)	Annual ordering & Carrying cost offer Discount (₹) (A)+(B)-(C)
40,000	1	40,000	20,000	1000	4,00,000	40,000	3,61,000
	2	20,000	10,000	2000	2,00,000	32,000	1,70,000
	4	10,000	5,000	4000	1,00,000	20,000	84,000
	5	8,000	4,000	5000	80,000	4,000	81,000

(iii) EQO = $\sqrt{\frac{2\times A\times O}{C}} = \sqrt{\frac{2\times 40,000\times 100}{2}}$ =2,000 kg

No discount on purchases, sine the quantity is less than 6,000 kg

Total carrying cost and ordering cost = $\left(\frac{40,000}{2,000}\times 1,000\right)+\left(\frac{2,000}{2}\times 20\right)$ = ₹40,000

Advise: Optimal order size = 2,000 units

Optimal number of orders p.a = $\frac{40,000}{2,000}$ = 20 orders

47. (i) EQO = $\sqrt{\frac{2\times A\times O}{C}}$

A = 250 kg × 52 weeks = 13,000 kg

O = ₹1,500

C = ₹100 per kg × 9.75% = ₹9.75 per kg

EOQ = $\sqrt{\frac{2\times 13,000\times 1,500}{9.75}}$ = 2,000 kg

(ii) Re-order level = Maximum Consumption × Maximum lead Time

= 300 × 7 = 2,100 kg

(iii) Maximum level = Reorder level + Reorder Qty – (Min consumption × min lead time)

= 2,100 + 2,000 – (200 × 5) = 3,100 kg

(iv) Minimum level = Reorder Level – (Average Consumption × Average Reorder Period)
= 2,100 – (250 × 6) = 600 kg

(v) Average Stock Level = (Minimum level + maximum level)/2
= (3,100 + 600)/2 = 1,850 kg

48. Maximum consumption per day = 350 ÷ 7 = 50 kg
Minimum consumption per day = 210 ÷ 7 = 30 kg
Average consumption per day = (50 + 30) ÷ 2 = 40 kg

(a) A = 40 kg × 365 = 14,600 kg
O = ₹200 per order
C = (1% × 12 × 100) + 2 = ₹14

$$EOQ = \sqrt{\frac{2 \times 14,600 \times 200}{14}} = 646 \text{ kg}$$

(b) Re-order level = Maximum Consumption × Maximum lead Time
= 50 × 9 = 450 kg

(c) Maximum level = Reorder level + Reorder Qty – (Min consumption × min lead time)
= 450 + 646 – (30 × 5) = 946 kg

(d) Minimum level = Reorder Level – (Average Consumption × Average Reorder Period)
= 450 – (40 × 7) = 170 kg

(e) Average Stock Level = (Minimum level + maximum level)/2
= (170 + 946)/2 = 558 kg

(f) Number of order per year = $\frac{\text{Annual consumption}}{\text{EOQ}} = \frac{14,600}{646}$ = 22.60 or 23 orders

(g) Total inventory cost = Purchase cost + Ordering cost + Carrying cost

$$= (14600 \times 100) + (23 \times 200) + \left(\frac{646}{2} \times 14\right) = ₹14,69,122$$

(h) New offer price = 100 – 1% = ₹99
Revised carrying cost = (99 × 1% × 12) + 2 = ₹13.88
Revised order quantity = 14600 ÷ 2 = 7,300 kg
Total inventory cost = Purchase cost + Ordering cost + Carrying cost

$$\text{(after discount)} = (14600 \times 99) + (2 \times 200) + \left(\frac{7300}{2} \times 13.88\right) = ₹14,96,462$$

Since cost is higher at offer price, thus offer should not be accepted.

(i) Let new price = y
New carrying cost = (y × 1% × 12) + 2 = 0.12y + 2
Total inventory cost = Purchase cost + Ordering cost + Carrying cost

$$= (14600 \times y) + (2 \times 200) + \left(\frac{7300}{2} \times (0.12y + 2)\right)$$

= 14,600y + 400 + 438y + 7300
= 15,038 + 7,700

$\therefore$ 14,69,122 = 15,038y + 7,700

y = ₹97.18

$\therefore$ Discount per unit = ₹100 – ₹97.18 = ₹2.82

Discount % = $\frac{2.82}{100} \times 100$ = 2.82%

49. (a) Annual raw material requirement = 50,000 × 12 × (8 ÷ 5) = 9,60,000 kg

Material requirement of Ae = 9,60,000 × (5 ÷ 8) = 6,00,000 kg

$$EOQ = \sqrt{\frac{2 \times A \times O}{C}} = \sqrt{\frac{2 \times 6,00,000 \times 375}{12\% \times 150}} = 5,000 \text{ kg}$$

(b) Maximum level for material Ae = ROL + ROQ – (Min. consumption × Min. lead time)

= (Max. consumption × Max. time) + ROQ – (Avg. consumption × Avg. time)

$$= \left(\frac{6,00,000}{25 \times 12} \times 3\right) + 7,500 - \left(\frac{6,00,000}{25 \times 12} \times 2\right) = 9,500 \text{ kg}$$

Also, since material Ae is perishable in nature and will become obsolete after 3.5 days,

$$\therefore \text{ Maximum level} = \left(\frac{6,00,000}{25 \times 12} \times 3.5\right) = 7,000 \text{ kg}$$

So maximum level will be minimum of the two values i.e. 7,000 kg and 9,500 kg.

$\therefore$ Maximum level for material Ae = 7,000 kg

50.

Statement of Total Cost and Classification

Item	Units	% of Total Units	Unit Cost (₹)	Total Cost (₹)	% of Total Cost	Category
1	7,000	3.1963	5.00	35,000	9.8378	B
2	24,000	10.9589	3.00	72,000	20.2378	A
3	1,500	0.6849	10.00	15,000	4.2162	B
4	600	0.2740	22.00	13,200	3.7103	C
5	38,000	17.3516	1.50	57,000	16.0216	A
6	40,000	18.2648	0.50	20,000	5.6216	B
7	60,000	27.3973	0.20	12,000	3.3730	C
8	3,000	1.3699	3.50	10,500	2.9513	C
9	300	0.1370	8.00	2,400	0.6746	C
10	29,000	13.2420	0.40	11,600	3.2605	C
11	11,500	5.2512	7.10	81,650	22.9502	A
12	4,100	1.8721	6.20	25,420	7.14151	B
	2,19,000	**100**		**3,55,770**	**100**	

51. Classification of the items of inventory as per ABC analysis is as follows:

(1) 15 number of units of varieties of inventory items should be classified as 'A' category item because of the following reasons:

(*a*) Constitute 0.375% of total number of varieties of inventory handled by stores, which is minimum as per given classification in the table.

(*b*) 50% of total use value of inventory holding (average), which is maximum, according to given table

(*c*) Highest in consumption, about 85% of inventory usage (in end-product).

(2) 110 number of varieties of inventory items should be classified as 'B' category item because of the following reasons:

(*a*) Constitute 2.75% of the total number of varieties of inventory items handled by stores of factory.

(*b*) Requires moderate investment of about 30% of total use value of inventory holding (average).

(*c*) Moderate in consumption, about 10% of inventory usage (in end product).

(3) 3,875 number of varieties of inventory items should be classified as 'C' category item because of the following reasons:

(*a*) Constitute 96.875% of total varieties of inventory items handled by stores of factory.

(*b*) Requires about 20% of total use value of inventory holding (average).

(*c*) Minimum inventory consumption i.e. about 5% of inventory usage (in end product)

52. Cost of raw material consumed = opening stock + Purchases – closing stock

= 90,000 + 2,70,000 – 1,10,000 = ₹2,50,000

$$\text{Average stock of material} = \sqrt{\frac{2\times 90{,}000\times 15}{0.30}} = \frac{90{,}000+1{,}10{,}000}{2} = ₹1{,}00{,}000$$

$$\text{Inventory turnover ratio (ITR)} = \frac{\text{RAw material consumed}}{\text{Average stock of material}} = \frac{2{,}50{,}000}{1{,}00{,}000} = 2.5 \text{ times}$$

$$\text{Average number of days of inventory holding} = \frac{365}{ITR} = \frac{365}{2.5} = 146 \text{ days}$$

53.

Particulars	Material A	Material B
Opening stock	10,000	9,000
Add: Purchases	52,000	27,000
Less: Closing stock	(6,000)	(11,000)
Material consumed (A)	56,000	25,000
Average stock [(Op + Cl),2] (B)	8,000	10,000
Inventory turnover rate (C = A ÷ B)	7 times	2.5 times
Number of days (365 ÷ C)	52 days	146 days

54.

(i) Calculation of Inventory Turnover Ratio

Particulars	Material A	Material B
Opening stock	30,000	32,000
Add: Purchases	90,000	51,000
Less: Closing Stock	20,000	14,000
Raw Material Consumed (A)	1,00,000	69,000
Average Stock $\left(\frac{\text{Opening+Closing}}{2}\right)$ (B)	$\frac{30,000+20,000}{2}$ = 25,000	$\frac{32,000+14,000}{2}$ = 23,000
Inventory Turnover Ratio (ITR)	$\frac{1,00,000}{25,000}$ = 4 times	$\frac{69,000}{23,000}$ = 3 times
Number of days (360 ÷ ITR)	$\frac{360}{4}$ = 90 days	$\frac{360}{3}$ = 120 days

(ii) Material A is moving faster than Material B.

55.

(i) Calculation of turnover ratio

Particulars	Material M	Material N
Turnover Ratio $\left(\frac{\text{Cost of stock of mateiral consumed}}{\text{Average stock of material}}\right)$	$\frac{6,00,000+9,50,000-4,50,000}{(6,00,000+4,50,000)/2}$ = 2.09	$\frac{10,00,000+18,40,000-7,25,000}{(10,00,000+7,25,000)/2}$ = 2.45
Average number of days for which the average inventory is held $\left(\frac{360}{\text{Inventory Turnover Ratio}}\right)$	$\frac{360}{2.09}$ = 172.25 days	$\frac{360}{2.45}$ = 146.94 days

(ii) Advise

On comparing the two, it can be said that Material M is slow moving as compared to Material N because of having higher inventory holding period of 172.25 days. Since the inventory holding period is high in both case then the exact decision should be taken by comparing the same with the industry standards.

56.

Statement of Cost

Particulars	Chemical A	Chemical B
Purchase price	1,00,000	1,04,000
Add: Basic custom duty @10%	10,000	10,400

(+) Railway freight (₹3,840 in ratio of 5:4 i.e. quantity purchased)	2,133	1,707
Total Cost (A)	1,12,133	1,16,107
Quantity Purchased	10,000	8,000
(-) Normal breakage	(500)	(320)
	9,500	7,680
(-) Provision for detonation @ 2%	(190)	(153.6)
Net Quantity (B)	9,310	7,526.4
Total cost per kg (A ÷ B)	12.04	15.43

57.

Computation of probability of stock out

Stock-out (units)	100	80	50	20	10	0	Total
No. of times	2	5	10	20	30	33	100
Probability	0.02	0.05	0.10	0.20	0.30	0.33	1.00

Statement showing determination of Optimal Stock

Safety Stock Units	Stock-out units	Prob.	Expected annual stock out units	Expected annual stock out costs	Annual holding cost	Total annual expected cost
100	0	0	0	0	5,000	5,000
80	20	0.02	0.4	60	4,000	4,060
50	50 30	0.02 0.05	1.0 1.5 2.5	150 225 375	2,500	2,875
20	80 60 30	0.02 0.05 0.10	1.6 3 3 7.6	240 450 450 1,140	1,000	2,140
10	90 70 40 10	0.02 0.05 0.10 0.20	1.8 3.5 4.0 2.0 11.3	270 525 600 300 1,695	500	2,195
0	100 80 50 20 10	0.02 0.05 0.10 0.20 0.30	2 4 5 4 3 18	300 600 750 600 450 2,700	0	2,700

It is recommended to maintain safety stock level of 20 units at which total cost is least i.e. ₹2,140.

58.

(a) Stores Ledger (Weighted Average Basis)

Date	Receipts			Issues			Balance		
	Qty. (kg)	Rate (₹)	Amount	Qty. (kg)	Rate (₹)	Amount	Qty. (kg)	Rate (₹)	Amount
1-4-19	-	-	-	-	-	-	1,000	15	15,000
4-4-19	3,000	16	48,000	-	-	-	4,000	15.75	63,000
8-4-19	-	-	-	1,000	15.75	15,750	3,000	15.75	47,250
15-4-19	1,500	18	27,000	-	-	-	4,500	16.50	74,250
20-4-19	-	-	-	1,200	16.50	19,800	3,300	16.50	54,450
25-4-19	-	-	-	300	18	5,400	3,000	16.35	49,050
26-4-19	-	-	-	1,000	16.35	16,350	2,000	16.35	32,700
28-4-19	500	17	8,500	-	-	-	2,500	16.48	41,200
30-4-19	-	-	-	50	16.48	824	2,450	16.48	40,376

(b) Stores Ledger (LIFO)

Date	Receipts			Issues			Balance		
	Qty. (kg)	Rate (₹)	Amount	Qty. (kg)	Rate (₹)	Amount	Qty. (kg)	Rate (₹)	Amount
1-4-19	-	-	-	-	-	-	1,000	15	15,000
4-4-19	3,000	16	48,000	-	-	-	1,000 3,000	15 16	15,000 48,000
8-4-19	-	-	-	1,000	16	16,000	1,000 2,000	15 16	15,000 32,000
15-4-19	1,500	18	27,000	-	-	-	1,000 2,000 1,500	15 16 18	15,000 32,000 27,000
20-4-19	-	-	-	1,200	18	21,600	1,000 2,000 300	15 16 18	15,000 32,000 5,400
25-4-19	-	-	-	300	18	5,400	1,000 2,000	15 16	15,000 32,000
26-4-19	-	-	-	1,000	16	16,000	1,000 1,000	15 16	15,000 16,000
28-4-19	500	17	8,500	-	-	-	1,000 1,000 500	15 16 17	15,000 16,000 8,500
30-4-19	-	-	-	50	17	850	1,000 1,000 450	15 16 17	15,000 16,000 7,650

(ii) Value of Material Consumed and Closing Stock

	Weighted Average Method (₹)	LIFO Method (₹)
Opening stock as on 01-04-2019	15,000	15,000
Add: Purchases	83,500	83,500
Less: Return to supplier	(5,400)	(5,400)
Less: Abnormal loss	(824)	(850)
Less: Closing stock as on 30-04-2019	(40,376)	(38,650)
Value of material consumed	**51,900**	**53,600**

59.

(A) Statement of receipts and issues using FIFO

Date	Receipts			Issues			Balance		
	Qty. (kg)	Rate (₹)	Amount	Qty. (kg)	Rate (₹)	Amount	Qty. (kg)	Rate (₹)	Amount
1-4-23	-	-	-	-	-	-	100	5	500
5-4-23	300	6	1800	-	-	-	100 300	5 6	500 1800
6-4-23	-	-	-	100 150	5 6	500 900	150	6	900
8-4-23	500	7	3500	-	-	-	150 500	6 7	900 3500
10-4-23	-	-	-	150 250	6 7	900 1750	250	7	1750
12-4-23	600	8	4800	-	-	-	250 600	7 8	1750 4800
14-4-23	-	-	-	250 250	7 8	1750 2000	350	8	2800

The value of material consumed = (500 + 900) + (900 + 1750) + (1750 + 2000) = ₹7,800

Balance of material as on 15-4-2023 = ₹2800

Statement of receipts and issues using LIFO

Date	Receipts			Issues			Balance		
	Qty. (kg)	Rate (₹)	Amount	Qty. (kg)	Rate (₹)	Amount	Qty. (kg)	Rate (₹)	Amount
1-4-23	-	-	-	-	-	-	100	5	500
5-4-23	300	6	1800	-	-	-	100 300	5 6	500 1800
6-4-23	-	-	-	250	6	1500	100 50	5 6	500 300

8-4-23	500	7	3500	-	-	-	100 50 500	5 6 7	500 300 3500
10-4-23	-	-	-	400	7	2800	100 50 100	5 6 7	500 300 700
12-4-23	600	8	4800	-	-	-	100 50 100 600	5 6 7 8	500 300 700 4800
14-4-23	-	-	-	500	8	4000	100 50 100 100	5 6 7 8	500 300 700 800

The value of material consumed = 1,500 + 2,800 + 4,000 = ₹8,300

Balance of material as on 15-4-2023 = 500 + 300 + 350 + 800 = ₹2,300

(b) On 6-4-2023, 250 units were issued to production. Under FIFO their value comes to ₹1,400 and under LIFO its ₹1,500. Hence, ₹100 more was charged to production under LIFO.

On 10-4-2023, 400 units were issued to production. Under FIFO their value comes to ₹2,650 and under LIFO its ₹2,800. Hence, ₹150 more was charged to production under LIFO.

On 14-4-2023, 500 units were issued to production. Under FIFO their value comes to ₹3,750 and under LIFO its ₹4,000. Hence, ₹250 more was charged to production under LIFO.

Thus, the total excess amount charged to production under LIFO comes to ₹500.

The difference of ₹500 (2,800 – 2,300) in value of closing stock is due to following reasons:

(a) In case of FIFO, all the 350 units of the closing stock belongs to the purchase of material made on 12-4-2023, whereas under LIFO these units were from opening balance and purchases made on 5-4-2023, 8-4-2023 and 12-4-2023.

(b) Due to different purchase price paid by the concern on different days of purchase, the value of closing stock differed under FIFO and LIFO. Under FIFO 350 units of closing stock were valued @ ₹8 per unit whereas under LIFO first 100 units were valued @₹5 per unit, next 50 units @₹6 per unit, next 100 units @₹7 per unit and last 100 units@₹8 per unit.

60.

Date Sep.	Receipts			Issues			Balance		
	Qty. (kg)	Rate (₹)	Amount	Qty. (kg)	Rate (₹)	Amount	Qty. (kg)	Rate (₹)	Amount
1	-	-	-	-	-	-	6,000	285.00	17,10,000
8	-	-	-	4,875	285.00	13,89,375	1,125	285.00	3,20,625

9	17,500	276.00	48,30,000	-	-	-	18,625	276.54	51,50,625
10	-	-	-	12,000	276.54	33,18,480	6,625	276.54	18,32,145
12	2,375	276.54	6,56,783	-	-	-	9,000	276.54	24,88,928
15	9,000	288.00	25,92,000	-	-	-	18,000	282.27	50,80,928
17	-	-	-	700	288.00	2,01,600	17,300	282.04	48,79,328
20	-	-	-	9,500	282.04	26,79,380	7,800	282.04	21,99,948
30	-	-	-	900*	282.04	2,53,836	6,900	282.04	19,46,112
30	-	-	-	300**	-	-	6,600	294.87	19,46,112

*900 units is abnormal loss, hence it will be transferred to costing P&L account.

**300 units is normal loss, hence it will be absorbed by good units.

61. Assumption – No opening stock on 1st January

Materials cost and control

Month	Opening balance	Purchase	Issued Units (₹)	Closing Balance
January	Nil	200	Nil	200
February	200	300	250	250
March	250	425	300	375
April	375	475	550	300
May	300	500	800	Nil
June	Nil	600	400	200

At the end of May, there was no closing stock, i.e. no opening stock on June. But there was closing stock of 200 units at the end of June.

Value of closing stock at the end of June:

FIFO – 200 units @ ₹20 = ₹4,000

LIFO – 200 units @ ₹20 = ₹4,000

Weighted average – 200 units @ ₹20 = ₹4,000

Hence the argument of the Chief Accountant is correct. He is correct only in the above case. If there was closing stock at the end of May, the argument of the Chief Accountant would not have been correct.

62. **Statement of receipts and issues using FIFO**

Date	Receipts			Issues			Balance		
	Qty. (kg)	Rate (₹)	Amount	Qty. (kg)	Rate (₹)	Amount	Qty. (kg)	Rate (₹)	Amount
Jan 1	100	1	100	-	-	-	100	1	100
Jan 20	100	2	200	-	-	-	100 100	1 2	100 200

Jan 22	-	-	-	60	1	60	40 100	1 2	40 200
Jan 23	-	-	-	40 20	1 2	40 40	80	2	160

Statement of receipts and issues using LIFO

Date	Receipts			Issues			Balance		
	Qty. (kg)	Rate (₹)	Amount	Qty. (kg)	Rate (₹)	Amount	Qty. (kg)	Rate (₹)	Amount
Jan 1	100	1	100	-	-	-	100	1	100
Jan 20	100	2	200	-	-	-	100 100	2 1	200 100
Jan 22	-	-	-	60	2	120	40 100	2 1	80 100
Jan 23	-	-	-	40 20	2 1	80 20	80	1	80

Statement of receipts and issues using Weighted Average

Date	Receipts			Issues			Balance		
	Qty. (kg)	Rate (₹)	Amount	Qty. (kg)	Rate (₹)	Amount	Qty. (kg)	Rate (₹)	Amount
Jan 1	100	1	100	-	-	-	100	1	100
Jan 20	100	2	200	-	-	-	200	1.50	300
Jan 22	-	-	-	60	1.50	90	140	1.50	210
Jan 23	-	-	-	60	1.50	90	80	1.50	120

Statement of Required Data

	FIFO (₹)	LIFO (₹)	Weighted Average (₹)
Material for Job W16	60	120	90
Material for Job W17	80	100	90
Closing stock	160	80	120

63.

Date	GRN/ MRN	Receipt			Requisition No.	Issue			Balance		
		Qty	Rate	Amount		Qty	Rate	Amount	Qty	Rate	Amount
1 Sep	-	-	-	-	-	-	-	-	25	6.50	162.5
4 Sep	-	-	-	-	85	8	6.5	52	17	6.50	110.5

Date	GRN/ MRN	Receipt			Requisition No.	Issue			Balance		
		Qty	Rate	Amount		Qty	Rate	Amount	Qty	Rate	Amount
6 Sep	26	50	5.75	287.50	-	-	-	-	17 50	6.50 5.75	162.50 287.50
7 Sep	-	-	-	-	97	12	6.50	78	5 50	6.50 5.75	32.50 287.50
10 Sep	-	-	-	-	-	10	5.75	57.50	5 40	6.50 5.75	32.50 230
12 Sep	-	-	-	-	108	5 10	6.50 5.75	32.50 57.50	30	5.75	172.50
13 Sep	-	-	-	-	110	20	5.75	115	10	5.75	57.50
15 Sep	33	25	6.10	152.50	-	-	-	-	10 25	5.75 6.10	57.50 152.50
17 Sep	-	-	-	-	121	10	5.75	57.50	25	6.10	152.50
19 Sep	38	10	5.75	57.50	-	-	-	-	25 10	6.10 5.75	152.50 57.50
20 Sep	4	5	5.75	28.75	-	-	-	-	5 25 10	5.75 6.10 5.75	28.75 152.50 57.50
26 Sep	-	-	-	-	146	5 5	5.75 6.10	28.75 30.50	20 10	6.10 5.75	122 57.50
30 Sep	-	-	-	-	Shortage	2	6.10	12.20	18 10	6.10 5.75	109.80 57.50

Working Notes:

(a) The material received as replacement form vendor is treated as fresh supply

(b) In the absence of any information, the price of the material returned from a user department on 20 Sep has been taken at the price of the latest issue made on 17 Sep. In FIFO method, physical flow of the material is irrelevant and issue price is based on first in first out.

(c) The issue of material on 26 Sep is made out of the material received from a user department on 20 Sep.

(d) The entries for transfer of material from one job to another on 22 Sep and 29 Sep do not affect the store ledger. Hence no entries are passed in its respect.

(e) The material found short as a result of stock taking has been written off at relevant issue price.

64. Ordering cost per order = 4,00,000 ÷ 320 = ₹1,250

Delivery cost per delivery = 1,35,000 ÷ 270 = ₹500

A = (1,250 × 100) + (500 × 70) = ₹1,60,000

B = (1,250 × 220) + (500 × 200) = ₹3,75,000

65.

(i) (d) Monthly Production of $X = 30,000$ kgs.

Raw Material Required $= \frac{50,000}{5} \times 3 = 30,000 \text{ kg}.$

$$\text{Material A} = \frac{50,000}{5} \times 3 = 30,000 \text{ kg}$$

$$\text{Material B} = \frac{50,000}{5} \times 2 = 20,000 \text{ kg}$$

(ii) (a) Calculation of Economic Order Quantity (EOQ):

$$\text{Material A} = \sqrt{\frac{2 \times \text{Annual consumption} \times \text{Ordercost}}{\text{Carrying cost per unit p.a.}}}$$

$$= \sqrt{\frac{2 \times (30,000 \times 12) \times 1,200}{15\% \text{ of} 30}} = 13,856 \text{ kg}$$

$$\text{Material B} = \sqrt{\frac{2 \times (20,000 \times 12) \times 1,200}{5\% \text{ of} 44}} = 16,181 \text{ kg}$$

(iii) (b) Calculation of Maximum Stock level: Since, the Material A is perishable in nature and it required to be used within 10 days, hence, the Maximum Stock Level shall be lower of two:

(a) Stock equal to 10 days consumption.

$$\frac{30000}{25} \times 10 \text{ days} = 12,000 \text{ kg}$$

(b) Maximum Stock Level for Matyerial A:

Re-order Quantity + Re-order level – (Min consumption* × Min. lead time)

Where, Re-order Quantity = 15,000 kg.

Re-order level = Max. Consumption* × Max. Lead time

= 30,000/25 × 2 days = 2,400 kg.

Maximum stock level = 15,000 kg. + 2,400 kg

(30,000/25 × 1 day)

= 17,400 – 1,200 = 16,200 kg.

Stock required for 10 days consumption is lower than the maximum stock level calculated through the formula. Therefore, maximum Stock Level will be **12,000 kg.**

(*Since, production is processed evenly throughout the month hence material consumption will also be even.)

(iv) (b) Calculation of Savings/loss in Material A if purchase quantity equals to EOQ.

	Purcahse Quantity = 15,000 kg	**Purchase Quantity = EOQ i.e. 13,856 kg.**
Annual consumption	3,60,000 kg. (30,000 × 12 months)	3,60,000 kg. (30,000 × 12 months)
No. of orders [Not-(i)]	30 (3,60,000 ÷ 12,000)	30 (3,60,000 ÷ 12,000)
Ordering Cost (a)	₹36,000 (₹1200 × 30)	₹36,000 (₹1200 × 30)
Carrying Cost (b) [Note-(ii)]	₹30,375 (15% of ₹27 × 7,500)	₹31,176 (15% of ₹30 × 6,928)

Purcahse Cost (c) (for good portion)	₹97,20,000 (₹27 × 3,60,000)	₹1,08,00,000 (₹30 × 3,60,000)
Loss due to obsolescence (d) [Note - (iii)]	₹24,30,000 [₹27 × (30 × 3,000)]	₹16,70,400 [₹30 × (30 × 1,856)]
Total Cost [(a) + (b) + (c) + (d)]	₹1,22,16,375	₹1,25,37,576

Purchasing of material - A at present policy of 15,000 kg saves **₹3,21,201**.

Notes: (i) Since, material gets obsolete after 10 days, the quantity in excess of 10 days consumption i.e. 12,000 kg a fresh order needs to be given.

(ii) Carrying cost is incurred on average stock of Materials purchased.

(iii) The excess quantity of material becomes obsoltete and loss has to be incurred.

(v) (c) Minimum Stock Level for Material A

= Re-order level – (Average Consumption Rate × Average Re-order Period)

= 2400 – (1200 × 1.5) = **600 kgs**

Re-order level = Max. Consumption* × Max. Lead time

= 30,000/25 × 2 days = 2,400 kg.

Average Consumption Rate = (30,000/25 + 30,000/25)/2

= 1,200 kg

Average Re-order Period = (1 + 2)/2 = 1.5 Days

Stock required for 10 days consumption is lower than the maximum stock level calculated through the formula. Therefore, maximum Stock Level will be 12,000 kg.

(*Since, production is processed evenly throughout the month hence material consumption will also be even.)

❑❑❑

5

CHAPTER

Overheads

Meaning of Overheads	• It is the cost which cannot be conveniently traced to or identified with any particular cost unit. • Generally, it is the aggregate of indirect material cost, indirect labour cost and indirect expenses. • It is also known as indirect or supplementary costs.
Classification of Overheads	• It means determination of categories, classes or groups in which overheads costs may be sub–divided. • It can be done on various basis which are as follows: ➢ On the basis of function ➢ On the basis of nature ➢ On the basis of element ➢ On the basis of control
Overheads on the basis of Function	• Under this basis, overheads are classified as factory overheads, office and administrative overheads and selling and distribution overheads. • **Factory Overheads** – It represent all those indirect costs that are incurred in the manufacturing process e.g. stock keeping expenses, consumable stores, factory rent, depreciation of plant, etc. • **Office and Administrative Overheads** – It represents costs which are associated with the general management and administration of the organization e.g. office rent, directors fees, depreciation of office building, accounts and audit expenses etc. • **Selling and Distribution Overheads** – It represents all the expenses incurred for selling and distribution of products e.g. salaries of sales staff, commission, sales promotion expenses, delivery van expenses, transit insurance etc.
Overheads on the basis of Nature	• **Variable Overheads** – These costs vary with the volume of activity. Generally, these tend to vary in same proportion as of output. E.g. indirect material, lubricants etc. • **Fixed Overheads** – These costs are incurred period wise and doesn't vary upto a certain output limit. E.g. depreciation of plant, salary paid to permanent employees, insurance etc. • **Semi-Variable Overheads** – These costs contain both fixed and variable components and are thus partly affected by fluctuations in the level of activity. E.g. telephone and internet expenses, electricity cost etc.

Overheads on the basis of Element	• **Indirect Material –** These don't form part of finished product (cost object) e.g. lubricants, cleaning cloth etc. • **Indirect Labour –** These can't be allocated but can be apportioned e.g. foreman salary, supervisor salary etc. • **Indirect Expenses –** These are expenses other than direct expenses e.g. insurance, depreciation, advertisement etc.
Overheads on the basis of Controllability	• **Controllable Costs –** These can be controlled by the managerial influence and proper policies e.g. wages and salary, material cost etc. • **Uncontrollable Costs –** These can't be controlled by managerial influence e.g. depreciation, rent etc.
Advantages of classifying overheads into fixed and variable	• Helps in the ascertainment of marginal cost. • It helps in controlling costs. • It helps in the preparation of flexible budget. • It helps in determining separate absorption rates for fixed and variable overheads. • It helps in decision making.
Steps for Accounting and Control of Overheads	• Estimation and collection of data related to overheads • Distribution of overheads by allocation, apportionment and re-apportionment. • Absorption of overheads to the cost object or cost unit or cost centre • Calculating and treating over and under absorption of overheads
Allocation of Overheads	• It is the process of charging the full amount of cost directly to a cost centre for which it was incurred. • E.g. salary paid to indirect worker can be allocated to the respective departments. • These are also called as traceable overheads because they can be traced to the specific department.
Apportionment of Overheads	• It is the process of charging the common costs to various cost centers on some basis. • Overheads which are not wholly incurred for a particular department are apportioned only. • E.g. factory rent is paid as a whole, so it should be apportioned to all departments.
Re-apportionment of Overheads	• It is the process of charging the service department expenses to the production department. • Methods for Re-apportionment are as follows: ➢ Direct re-distribution method ➢ Step method or non-reciprocal method ➢ Reciprocal method ➢ Simultaneous equation method ➢ Trial and error method ➢ Repeated distribution method

Absorption of Overheads	• It is the process of charging or recovering or absorbing of overheads from the output produced in respective departments. • In other words, it is the allotment of overheads to cost units by means of rates separately calculated for each cost centre. • Variable manufacturing overheads are absorbed on the basis of actual production. • Fixed manufacturing overheads are absorbed on the basis of normal capacity.
Methods of Absorption of overheads	• A method of overhead absorption is considered appropriate if the total amount of overhead absorbed in a period does not fluctuate materially from the actual expenses incurred in the period. • **Direct Material Cost Percentage Method** ➢ $\text{Absorption Rate} = \frac{\text{Total overheads of the cost centre}}{\text{Total Direct Labour Cost}}$ ➢ This method is suitable: ◆ where the prices of material don't fluctuate much. ◆ where the output is uniform ◆ where the proportion of overheads tot total cost is insignificant • **Direct Labour Cost Percentage Method** ➢ $\text{Absorption Rate} = \frac{\text{Total overheads of the cost centre}}{\text{Total Direct Labour Cost}}$ ➢ This method is suitable: ◆ where labour is the major factor of production ◆ where labour rates do not fluctuate widely ◆ where both labour employed and work done are of uniform type. • **Prime Cost Percentage Method** ➢ $\text{Absorption Rate} = \frac{\text{Total overheads of the cost centre}}{\text{Total Prime Cost}}$ ➢ This method is suitable: ◆ where output is uniform ◆ where both the quantity of direct materials and direct labour hours are constant • **Labour Hour Rate Method** ➢ $\text{Absorption Rate} = \frac{\text{Total overheads of the cost centre}}{\text{Total Labour Hours}}$ ➢ This method is suitable where manual labour is a dominant factor of production. • **Machine Hour Rate Method** ➢ $\text{Absorption Rate} = \frac{\text{Total overheads of the cost centre}}{\text{Total Machine Hours}}$ ➢ This method is suitable where major portion of production is performed by machinery.

	• **Rate Per Unit of Output Method** ➢ $\text{Absorption Rate} = \frac{\text{Total overheads of the cost centre}}{\text{Total units}}$ ➢ This method is suitable where similar type of goods are produced in large quantities.
Types of Overhead Rates	• Normal Rate = $\frac{\text{Actual amount of overheads}}{\text{Actual base}}$ • Pre-determined Rate = $\frac{\text{Budgeted amount of overheads}}{\text{Budgeted base}}$ • Blanket Rate = $\frac{\text{Total overheads of the factory}}{\text{Total base}}$ • Departmental Rate = $\frac{\text{Overheads of the particular department}}{\text{Actual base of the department}}$
Blanket Overhead Rate	• It is one single overhead absorption rate for the whole factory. • Blanket Overhead Rate = $\frac{\text{Budgeted production overhead costs for the whole factory}}{\text{Total units of the selected base}}$ • It involves disadvantages of too much averaging. • It is useful in companies producing a main product in continuous processes, e.g. chemical plant, glass factory etc. • It should be applied in case ➢ when company deals in only one major product ➢ In case of multiple products, the product must pass through all departments with same length of time in each department.
Over and Under recovery of overheads	• Overheads are absorbed on the basis of pre-determined rates, which are based on budgeted output and budgeted overheads. • But actual output or overheads may be different from budgeted. • As a result absorbed overheads may be more (Over absorption) or less (Under absorption).
Treatment of Under or Over absorbed overheads	• Use of Supplementary Rate ➢ It is used when: a. There is a serious estimation errors b. When there is a substantial change in the level of activities c. When there is a major change in the production method d. In case of contract on cost plus basis. ➢ There are two types of supplementary rates viz. positive and negative ➢ Under absorption is corrected by using positive supplementary rate, i.e., the unrecovered amount of overhead cost is added to the cost of sales, work-in-progress and unsold stock. ➢ Over absorption is corrected by using negative supplementary rate, i:e., the excess recovery of overhead cost is deducted from the cost of sales, work-in-progress and unsold stock

	• Carry Over of Overheads ➢ It is to be used when it is hoped that an over absorption in the current period will be more or less neutralized by under absorption in the next period and vice versa. ➢ E.g. in case of seasonal industries or cyclical businesses or in case of new projects ➢ The criticism against this method is that overheads of a particular period are not charged to that period entirely. ➢ Carryover of overheads adversely affects inter-temporal comparisons which may hinder managerial planning and control. • Transfer to Costing Profit and Loss Account ➢ It is to be used if under or over absorption is of relatively very small value or due to abnormal factors like fire, strike etc. ➢ The amount of under or over absorption due to above factors should be charged to the costing profit and loss account.
Causes of Under or Over recovery of overheads	• Estimates of overheads may prove erroneous • Actual output buffers from budgeted output • Actual hours worked buffering from budgeted hours • Increase in price of direct materials • Change in wage rate • Change in the ratio of skilled and unskilled workers • Degree of mechanization • Inappropriate method of absorption • Capacity utilization • Seasonal fluctuations • Cyclical fluctuations • Change in work situations
Treatment of administration overheads	• These are costs of formulating the policy, directing the organization and controlling the operation of an undertaking. • E.g. office rent, director's fees, managers' salaries etc. • Treatment ➢ Charge to Costing P&L Account – In this method, administrative over-heads should be treated as fixed cost as they are concerned with the formulation of policy and charged to Costing P&L Account. ➢ Apportionment between production and selling & distribution – In this method, it is assumed that administrative overheads are incurred both for production and for selling & distribution and thus to be divided on some equitable basis amount them. ➢ Treat as separate element of total cost – In this method, administration overheads ore considered as a cost of a distinct and identifiable operation of the organization necessary to carry on its activity and thus are recovered on some equitable basis.

Treatment of Selling & Distribution Overheads	• Selling expenses are incurred for the purpose of promoting, marketing etc. of different products. • Distribution expenses are relating to delivery and dispatch of goods to customers. • Treatment ➢ Allocation or apportionment – In this method, expenses are either allocated or apportioned to the various cost centres or goods on some equitable basis. ➢ Absorption or recovery – In this method, expense are recovered by using any of the methods like percentage on selling price, rate per unit sold etc.
Types of Capacity	• Installed or Rated Capacity • Practical Capacity • Normal Capacity • Actual Capacity • Idle Capacity
Installed or Rated Capacity	• It is the maximum capacity of producing goods or services. • It is determined on the basis of technical specification or technical evaluation. • It is also known as theoretical capacity.
Practical Capacity	• It is actually utilized capacity of plant. • It is also known as operating capacity or net capacity or available capacity. • It is computed after considering repairs, maintenance, idle time etc. • It is also used as a basis for determining overhead rates
Normal Capacity	• It is the capacity expected to be utilized or achieved over a period of time under normal circumstances. • It is computed after adjusting for planned maintenance. • It is also known as average capacity or capacity based on sales expectancy.
Actual Capacity	• It is the capacity actually achieved during the period. • It is presented as a percentage of installed capacity.
Idle Capacity	• It is the capacity which cannot be effectively utilized in production. • It can be either due to normal reasons or abnormal reasons. • Normal idle capacity is the difference between installed capacity and normal capacity i.e. Installed capacity – Normal capacity • Abnormal idle capacity is the difference between normal capacity and actual capacity if actual is lower than normal i.e. Normal capacity – Actual capacity
Treatment of Idle Capacity	• If it is due to unavoidable reasons such as repairs, maintenance etc. than a supplementary rate may be used to recover it from the production. • If it is due to avoidable reasons such as power failure, faulty planning etc. then it should be charged to costing profit and loss account. • If it is due to seasonal factors then, the cost should be charged to cost of production by inflating overhead rates.

Overhead Cost	Bases of Apportionment
1. i. Rent and other building expenses ii. Lighting and heating (conditioning) iii. Fire precaution service iv. Air-conditioning	Floor area, or volume of department
2. i. Perquisites ii. Labour welfare expenses iii. Time keeping iv. Personnel office v. Supervision	Number of workers
3. i. Compensation to workers ii. Holiday pay iii. ESI and PF contribution iv. Perquisites	Direct wages
4. General overhead	Direct labour hour, or direct wages or machine hours
5. i. Depreciation of plant and machinery ii. Repairs and maintenance of plant & machinery iii. Insurance of stock	Capital values
6. i. Power/steam consumption ii. Internal transport iii. Managerial salaries	Technical estimates
7. Lighting expenses (light)	No. of light points or area or metered units
8. Electric power (machine operation)	Horse power or machines, or number of machine hour or value of machines or units consumed
9. i. Material handling ii. Stores overhead	Weight of materials, or volume of materials, or value of materials or unit of materials

Cost of the Service Department	Basis of Re-apportionment
1. Maintenance and repair shop 2. Planning and progress 3. Tool room	Direct labour hours, machine hours, direct labour wages
4. Canteen and welfare 5. Hospital and dispensary 6. Personnel department	No. of direct workers, no. of employees etc.
7. Time-keeping	No. of card punched, no. of employees
8. Computer section	Computer hours, specific allocation to departments
9. Power house (electric lighting cost)	Floor area, cubic content, no. of electric point

Cost of the Service Department	Basis of Re-apportionment
1. Maintenance and repair shop 2. Planning and progress 3. Tool room	Direct labour hours, machine hours, direct labour wages
10. Power house (electric power cost)	Horse power, kwh, horse power hours, kwh hours
11. Stores department	No. of requisition, weight or value of material
12. Transport department	Crane hours, truck hours, truck tonnage etc.
13. Fire protection	Capital values
14. Inspection	Inspection hours

PRACTICAL QUESTIONS

1. SK Ltd. has three production departments and four service departments. The expenses for these departments as per Primary Distribution Summary are as follows: **[SM]**

Production Departments:	(₹)	(₹)
A	30,00,000	
B	26,00,000	
C	24,00,000	80,00,000
Service Departments:	**(₹)**	**(₹)**
Stores	4,00,000	
Time-keeping and accounts	3,00,000	
Power	1,60,000	
Canteen	1,00,000	9,60,000

The following information is also available in respect of the production departments:

	Dept. A	Dept. B	Dept. C
Horse power of Machine	300	300	200
Number of workers	20	15	15
Value of stores requisition in (₹)	2,50,000	1,50,000	1,00,000

Prepare a statement apportioning the costs of service departments over the production departments.

Ans. ₹34,20,000; ₹29,00,000; ₹26,40,000.

2. SK Ltd. is a manufacturing company having three production departments, 'A', 'B' and 'C' and two service departments 'X' and 'Y'. The following is the budget for March 2022: **[SM]**

	Total (₹)		A (₹)	B (₹)	C (₹)	X (₹)	Y (₹)
Direct material			1,00,000	2,00,000	4,00,000	2,00,000	1,00,000
Direct wages			5,00,000	2,00,000	8,00,000	1,00,000	2,00,000
Factory rent	4,00,000						
Power	2,50,000						
Depreciation	1,00,000						
Other Overheads	9,00,000						

	Total (₹)		A (₹)	B (₹)	C (₹)	X (₹)	Y (₹)
Additional information:							
Area (Sq. ft.)		500		250	500	250	500
Capital value of assets ('lakhs)		20		40	20	10	10
Machine hours		1,000		2,000	4,000	1,000	1,000
Horse power of machines		50		40	20	15	25

A technical assessment of the apportionment of expenses of service departments is as under:

	A	B	C	X	Y
Service Dept. 'X' (%)	45	15	30	–	10
Service Dept. 'Y' (%)	60	35	–	5	–

Required:

(i) Prepare a statement showing distribution of overheads to various departments

(ii) Prepare a statement showing re-distribution of service department expenses to production departments using Trial and error method.

Ans. (i) ₹2,70,000; ₹3,70,000; ₹6,00,000; ₹4,75,000; ₹5,35,000; (ii) ₹8,48,200; ₹6,50,500; ₹7,51,300.

3. An engine manufacturing company has two production departments: (i) Mobile and (ii) Boat and two service departments: (i) Maintenance and (ii) Factory. Budgeted cost data and relevant cost drivers are as follows:

Departmental Costs:	₹
Mobile	6,00,000
Boat	17,00,000
Factory	3,00,000
Maintenance	2,40,000
Cost Drivers:	
Factory department:	**No. of employees**
Mobile department	1,080 employees
Boat department	270 employees
Maintenance department	150 employees
	1,500 employees
Maintenance department:	**No. of work orders**
Mobile department	570 orders
Boat department	190 orders
Maintenance department	40 orders
	800 orders

Required:

(a) Compute the cost driver allocation percentage and then use these percentages to allocate the service department costs by using direct method.

(b) Compute the cost driver allocation percentage and then use these percentages to allocate the service department costs by using non-reciprocal method/step method.

Ans. (a) ₹10,20,000; ₹18,20,000; (b) 10,18,500; ₹18,21,500.

4. SK Ltd., have three departments which are regarded as production departments. Service departments' costs are distributed to these production departments using the "Step Ladder Method" of distribution. Estimates of factory overhead costs to be incurred by each department in the forthcoming year are as follows. Data required for distribution is also shown against each department: **[SM]**

Department	Factory Overhead (₹)	Direct labour hours	No. of employees	Area in sq.m.
Production:				
X	1,93,000	4,000	100	3,000
Y	64,000	3,000	125	1,500
Z	83,000	4,000	85	1,500
Service:				
P	45,000	1,000	10	500
Q	75,000	5,000	50	1,500
R	1,05,000	6,000	40	1,000
S	30,000	3,000	50	1,000

The overhead costs of the four service departments are distributed in the same order, viz., P, Q, R, and S respectively on the following basis.

Department	Basis
P	Number of employees
Q	Direct labour hours
R	Area in square metres
S	Direct labour hours

You are required to:

(a) Prepare a schedule showing the distribution of overhead costs of the four service departments to the three production departments; and

(b) Calculate the overhead recovery rate per direct labour hour for each of the three production departments.

Ans. (a) ₹3,00,000; ₹1,35,000; ₹1,60,000; (b) ₹75; ₹45; ₹40.

5. M/s SK Limited has its own power plant and generates its own power. Information regarding power requirements and power used are as follows: **[Nov 2018]**

	Production Dept.		Service Dept.	
	A	B	X	Y
		(Horse power hours)		
Needed capacity production	20,000	25,000	15,000	10,000
Used during the month of May	16,000	20,000	12,000	8,000

During the quarter ended September 2018, costs for generating power amounted to ₹12.60 lakhs out of which ₹4.20 lakhs was considered as fixed cost.

Service Dept. X renders service to A, B and Y in the ratio of 6:4:2 whereas department Y renders service to A and B in the ratio 4:1. The direct labour hours of Department A and B are 67,500 hours and 48,750 hours respectively. Required:

1. Prepare overheads distribution sheet
2. Calculate factory overhead per labour hour for the department A and B

Ans. (1) ₹6,75,000; ₹5,85,000; (2) ₹10; ₹12.

6. From the following data, work out the predetermined machine hour rates for Departments A and B of a factory:

	Preliminary estimates of expenses		
Total (₹)	**Dept. A (₹)**	**Dept. B (₹)**	
Power	15,000	– –	
Spare Parts	8,000	3,000	5,000
Consumable stores	5,000	2,000	3,000
Depreciation on machinery	30,000	10,000	20,000
Insurance on machinery	3,000	– –	
Indirect labour	40,000	– –	
Building maintenance	7,000	– –	

The final estimates are to be prepared on the basis of above figures after making into consideration the following factors:

(*a*) An increase of 10 per cent in price of spare parts.

(*b*) An increase of 20 per cent in the consumption of spare parts for department B only.

(*c*) Increase in the straight line method of depreciation from 10 percent on the original value machinery to 12 per cent.

(*d*) 15 per cent general increase in wage rates.

The following information is available:

Dept. A	**Dept. B**	
Estimated direct labour hours	80,000	1,20,000
Ratio of K.W. rating	3	2
Estimated machine hours	25,000	30,000
Floor Space (Sq. ft)	15,000	20,000

Ans. ₹1.95; ₹2.44.

7. A company which sells four products, some of them unprofitable, proposes discontinuing the sale of one of them. The following information is available regarding income, costs and activity for the year ended 31st March. **[SM]**

	Product A	**Product B**	**Product C**	**Product D**
Sales (₹)	3,00,000	5,00,000	2,50,000	4,50,000
Cost of sales (₹)	2,00,000	4,50,000	2,10,000	2,25,000
Area of storage (Sq. Ft.)	50,000	40,000	80,000	30,000
Number of parcels sent	1,00,000	1,50,000	75,000	1,75,000
Number of invoices sent	80,000	1,40,000	60,000	1,20,000

Selling and Distribution overheads and the basis of allocation are:

		Basis of allocation to products
Fixed Costs	(₹)	
Rent and insurance	30,000	Sq. Ft.
Depreciation	10,000	Parcel
Salesmen's salaries and expenses	60,000	Sales volume
Administrative wages and salaries	50,000	No. of invoices
Variable Costs:		
Packing wages & materials	₹0.20 sper parcel	
Commission	4% of sales	
Stationery	₹0.10 per invoice	

You are required to prepare Profit & Loss Statement, showing the percentage or profit or loss to sales for each product.

Ans. 9.50%; –12.10%; –8.80%; 26.40%.

8. The following information relates to the activities of a production department for a certain period in a factory:

Material used	₹72,000
Direct wages	₹60,000
Hours of machine operation	20,000
Labour hours worked	24,000
Overhead chargeable to the department	₹48,000
On one order carried out in the department during the period, the relevant data were:	
Material used	₹4,000
Labour Hours	1,650
Direct Wages	₹3,300
Machine hours	1,200

Prepare a comparative statement of cost of this order by using the following three methods of recovery of overheads:

(i) Direct Labour Hour Rate Method

(ii) Direct Labour Cost Rate Method

(iii) Machine Hour Rate Method

Ans. (i) ₹10,600; (ii) ₹9,940; (iii) ₹10,180.

9. A machine costs ₹90,000 and is deemed to have a scrap value of 5% at the end of its effective life (19 years). Ordinarily the machine is expected to run for 2,400 hours per annum but it is estimated that 150 hours will be lost for normal repairs and maintenance and further 750 hours will be lost due to staggering. The other details in respect of the machine shop are:

(i) Wages, bonus and provident fund contribution of each of two operators (each operator is in charge of two machines)	₹6,000 per year
(ii) Rent and rates of the shop	₹3,000 per year
(iii) General Lighting of the shop	₹250 per month
(iv) Insurance premium for the machine	₹200 per quarter

(v) Cost of repairs and maintenance per machine ₹250 per month

(vi) Shop supervisor salary ₹500 per month

(vii) Power consumption of the machine per hour 20 units, rate of power per 100 units ₹10

(viii) Other factory overheads attributable to the shop ₹4,000 per annum

There are four identical machines in the shop. The supervisor is expected to devote one-fifth of his time for supervising the machine. Compute a comprehensive machine hour rate from the above details.

Ans. ₹12

10. The following particulars refer to process used in the treatment of a material subsequently incorporated in a component forming part of an electrical appliance:

(a) The original cost of the machine used (purchased in January 2015) was ₹10,000. Its estimated life is 10 years, the estimated scrap value at the end of its life is ₹1,000 and the estimated working time per year (50weeks of 44 hours) is 2,200 hours of which machine maintenance etc. is estimated to take up 200 hours. No other loss of working time is expected. Setting up time estimated at 100 hours. (Bank holidays are to be ignored).

(b) Electricity used in the machine during production is 16 units per hour at a cost of 9 p. per unit.

(c) The machine requires a chemical solution which is replaced at the end of each week at a cost of ₹20 each time.

(d) The estimated cost of maintenance per year is ₹1,200

(e) Two attendants control the operation of the machine together with five other identical machines. Their combined weekly wages, insurance and the employer's contributions to holiday pay amount to ₹120.

(f) Department and general works overheads allocated to this machine for the year amounts to ₹2,000.

You are required to calculate the machine- hour rate in each of the following cases:

(i) If setting up time is taken as productive time and the current is taken during setting up

(ii) If setting up time is taken as productive time and the current is not taken during setting up

(iii) If setting up time is taken as unproductive time but current is taken during setting up

(iv) If setting up time is taken as unproductive time and no current is taken during setting up

Ans. (i) ₹4.49; (ii) ₹4.42; (iii) ₹4.73; (iv) ₹4.65.

11. (a) Calculate the machine hour rate of a machine with information given below:

Operating data:

Total number of weeks per quarter = 13

Total number of hours per week = 48

Stoppage due to maintenance = 8 hrs. p.m.

Time taken for set-up = 2 hrs./week

Cost details:

Cost of machine = ₹2,00,000

Repair and maintenance = ₹24,000 p.a.

Consumable stores	= ₹30,000 p.a.
Rent, rates and taxes	= ₹8,000 per quarter
Operator's wages	= ₹3,000 p.m.
Supervisor's salary	= ₹5,000 p.m.
Cost of power	= 15 units per hour at ₹3 per unit

Notes:

(i) Life of the machine is 10 years. Depreciation is provided on straight line basis and is treated as variable cost.

(ii) Repairs and maintenance and consumables stores are variable costs.

(iii) Power is consumed for production runs only and for set-up. But cost of power is to be borne by the total time excluding maintenance stoppages.

(iv) The supervisor is supervising work on five identical machines including the one now considered.

(b) The company hires out excess capacity in the machine shop for outside jobs. Assuming that hire charges are fixed at variable cost plus 20% what rate should be quoted by the company?

Ans. (a) 109.16; (b) ₹91.

12. Work out the Machine Hour Rate for the following machine whose scrap value is Nil;

Details		Amount (₹)
Cost of machine		1,90,000
Freight and installation charges		10,000
Working life		Five years
Repairs and maintenance		40% of Depreciation
Annual power expenses @ 25 paise per unit		₹6,000
Eight hourly day charges:		
(i)	Power	24
(ii)	Lubricant oil	20
(iii)	Consumable Stores	28
(iv)	Wages	80

Ans. ₹47

13. From the following data of textile factory machine room, compute an hourly machine rate, assuming that the machine room will work on 90% capacity throughout the year and that a breakdown allowance of 10%, in addition, is reasonable.

There are 3 days holiday at Deepawali, 2 days at Holi and 2 days Christmas, exclusive of Sundays. The factory works 8 hours a day and 4 hours on Saturday. The year in question is not a leap year.

Number of machines (each of the same type)	40
Expenses:	₹Per annum
Power	3,12,000
Light	64,000
Salaries to foremen	1,20,000

Lubricating oil	6,600
Repairs to machines	1,44,600
Depreciation	78,560
Total	7,25,760

Ans. ₹10

14. A machine shop has 8 identical Drilling Machines run by 6 operators. The machines cannot be worked without an operator wholly engaged on it. The original cost of all these 8 machines works out to ₹8 lakhs. The particulars are furnished for a 6 months period: **[SM, Similar Jan 2021]**

Normal available hours per months	208
Absenteeism (without pay) hours p.m.	18
Leave (with pay) hours p.m.	20
Normal idle time unavoidable hours p.m.	10
Average rate of wages per day of 8 hours	₹20
Production bonus estimated	15% on wages
Value of power consumed	₹8,050
Supervision and Indirect Labour	₹3,300
Lighting and Electricity	₹1,200

Theses particulars are for a year:

Repairs and maintenance including consumable is 3% on value of machines

Insurance ₹40,000

Depreciation 10% on original cost

Other sundry works expenses ₹12,000

General Management expenses – allocated ₹54,530

You are required to work out a comprehensive machine hour rate for the Machine Shop.

Ans. ₹23.86

15. In a factory, a machine is considered to work for 208 hours in a month. It includes maintenance time of 8 hours and set up time of 20 hours. The expense data relating to the machine are as under: **[MTP – Nov 2018]**

Cost of the machine is ₹5,00,000. Life 10 years.

Estimated scrap value at the end of life is	₹20,000
Repairs and maintenance per annum	₹60,480
Consumable stores per annum	₹47,520
Rent of building per annum (The machine under reference occupies 1/6 of area)	₹72,000
Supervisor's Salary per month (Common to three machines)	₹6,000
Wages of operator per month per machine	₹2,500
General lighting charges per month allocated to the machine	₹1,000
Power 25 units per hour at	₹2 per unit

Power is required for productive purposes only. Set up time, though productive, does not require power. The Supervisor and Operator are permanent. Repairs and maintenance and consumable stores vary with the running of the machine. Required: Calculate a two-tier machine hour rate for (a) set up time and (b) running time.

Ans. (a) ₹52.50; (b) ₹152.50.

16. SK Enterprises undertakes different job, A, B and C. All of them require the use of special machine and also the use of a computer. The computer is hired and the hire charges work out of ₹4,20,000 per annum. The expenses regarding the machine are estimated as follows:

[SM, Similar Nov 2022]

Rent for the quarter	₹17,500
Depreciation per annum	₹2,00,000
Indirect charges per annum	₹1,50,000

During the first month of operation the following details were taken from the job register:

Job	A	B	C
Number of hours the machine was used:			
Without the use of computer	600	900	–
With use of computer	400	600	1,000

You are required to compute the machine hour rate:

For the firm as a whole for the month when the computer was used and when the computer was not used.

For the individuals job A, B and C

Ans. (a) ₹10; ₹27.50; (b) ₹17; ₹17; ₹27.50.

17. Meerut manufacturing company makes several product lines which are processed through three production departments – X, Y and Z. The information concerning the relevant data for a year is as follows:

	Factory overhead (including share of Service dept.)	Direct Labour Hours	Direct Labour Cost
Department X	₹1,24,000	80,000	₹1,60,000
Department Y	2,30,000	1,15000	2,41,500
Department Z	5,46,000	1,05,000	1,99,500

Production records at the end to the year indicated the following for the product line 'Krish'. 20,000 units

Produced	Dept. X	Dept. Y	Dept. Z
Prime Cost	₹45,000	₹10,500	₹59,500
Direct Labour Hours	10,000	5,000	30,000

You are required to:

(a) Calculate the departmental and plant-wise, over-head rates based on direct labour hours;

(b) Compute the cost of 'Krish' line for the year by using (i) Plant-wise rate and (ii) department rates;

Comment on the results.

Ans. (a) ₹1.55; ₹2; ₹5.20; ₹3; (b) (i) ₹2,96,500; (ii) ₹2,50,000.

18. SE Limited manufactures two products – A and B. The company had budgeted factory overheads amounting to ₹36,72,000 and budgeted direct labour hour of 1,80,000 hours. The company uses pre-determined overhead recovery rate for product costing purposes.

The department-wise break-up of the overheads and direct labour hours were as follows:

Particulars	Budgeted Overheads	Budgeted Direct Labour Hours	Rate per Direct Labour Hour
Department Pie	₹25,92,000	90,000 hours	₹28.80
Department Qui	₹10,80,000	90,000 hours	₹12.00
Total	₹36,72,000	1,80,000 hours	

Additional information:

Each unit of product A requires 4 hours in department Pie and 1 hour in department Qui. Also, each unit of product B requires 1 hours in department Pie and 4 hours in department Qui.

This was the first year of the company's operation. There was no WIP at the end of the year. However, 1,800 and 5,400 units of Products A and B were on hand at the end of the year.

The budgeted activity has been attained by the company. You are required to:

(i) Determine the production and sales quantities of both products 'A' and 'B' for the above year.

(ii) Ascertain the effect of using a pre-determined overhead rate instead of department-wise rates on the company's income due to its effect on stock value.

(iii) Calculate the difference in the selling price due to the use of pre-determined overhead rate instead of using department-wise overhead rates. Assume that the direct costs (material and labour costs) per unit of products A and B were ₹25 and ₹40 respectively and the selling price is fixed by adding 40% over and above these costs to cover profit and selling and administration overhead.

Ans. (i) Production – 18,000; 18,000; Sales 16,200; 12,600; (ii) Profit increase by ₹90,720; (iii) Product A underpriced by ₹35.28 and Product B over priced by ₹35.28.

19. Job No. 198 was commenced on October 10 and completed on November 1. Materials used were ₹6,000 and labour charged directly to the job was ₹4,000. Other information is as follows: **[SM]**

Machine No. 215 used for 40 hours, the machine hour rate being ₹35.

Machine No. 160 used for 30 hours, the machine hour rate being ₹40.

6 welders worked on the job for 5 days of 8 hours each: the direct labour hour per welder is ₹20.

Expenses not included for calculating the machine hour or direct labour hour rate totaled ₹20,000, total direct wages for the period being ₹2,00,000. Ascertain the works costs of job no. 198.

Ans. ₹17,800

20. In a manufacturing unit, overhead was recovered at a predetermined rate of ₹25 per man-day. The total factory overhead expenses incurred and the man-days actually worked were ₹41.50 lakhs and 1.50 lakhs days respectively. **[SM]**

Out of the 40,000 units produced during a period, 30,000 were sold. On analyzing the reasons, it was found that 60% of the unabsorbed overheads were due to defective planning and the rest were attributable to increase in overhead costs. How would unabsorbed overheads be treated in cost accounts?

Ans. Under recovery ₹4,00,000.

21. The total overhead expenses of a factory are ₹4,50,608. Taking into account the normal working of the factory, overhead was recovered from production at ₹1.25 per hour. The actual hours worked were 2,93,104. How would your proceed to close the books of accounts, assuming that besides 7,800 units produced of which 7,000 were sold, there were 200 equivalent units in work-in-progress. On investigation it was found that 50% of the unabsorbed overhead was on account of increase in the cost of indirect material and indirect labour and the other 50% was due to factory's inefficiency. Also give the profit implication of the method suggested. **[SM]**

Ans. Under recovery ₹84,228.

22. SK Ltd. manufactures a single product and absorbs the production overheads at a pre-determined rate of ₹10 per machine hour. At the end of current financial year, it has been found that actual production overheads incurred were ₹6,00,000. It includes ₹45,000 on account of written off obsolete stores and ₹30,000 being the wages paid for the strike period under an award. The production and sales data for the current year is as under: **[SM]**

Production:

Finished goods	20,000 units
Work-in-progress	8,000 units
(50% complete in all respects)	

Sales:

Finished goods	18,000 units

The actual machine hours worked during the period were 48,000. It has been found that one-third of the under-absorption of production overheads was due to lack of production planning and the rest was attributable to normal increase in costs.

Calculate the amount of under-absorption of production overheads during the current year

Show the accounting treatment of under-absorption of production overheads.

Ans. Under recover ₹45,000.

23. SK Ltd. has calculated a predetermined overhead rate of ₹22 per machine hour for its Quality Check (QC) department. This rate has been calculated for the budgeted level of activity and is considered as appropriate for absorbing overheads. The following overhead expenditures at various activity levels had been estimated. **[MTP – July 2020]**

Testing Overheads	Number of machine hours
₹3,38,875	14,500
₹3,47,625	15,500
₹3,56,375	16,500

You are required to:

(a) Calculate the variable overhead absorption rate per machine hour

(b) Calculate the estimated total fixed overheads

(c) Calculate the budgeted level of activity in machine hours

(d) Calculate the amount of under/over-recovery of overheads if the actual machine hours were 14,970 and actual overheads were ₹3,22,000.

(e) Analyze the arguments for and against using departmental absorption rates as opposed to a single or blanket factory wide rate.

Ans. (a) ₹8.75; (b) ₹2,12,000; (c) 16,000; (d) Over recovery ₹7,340.

24. SK Ltd. manufactures two products A and B. The manufacturing division consists of two production departments P1 and P2 and two service departments S1 and S2. **[SM, MTP Nov 2020]**

Budgeted overhead rates are used in the production departments to absorb factory overheads to the products. The rate of Department P1 is based on machine hours while the rate of department P2 is based on direct labour hours. For allocating the service department costs to production departments, the basis adopted is as follows:

Cost of department S1 to P1 and P2 equal and

Cost of department S2 to P1 and P2 in the ratio of 2:1 respectively.

The following budgeted and actual data are available:

Annual Profit Plan Data:

Factory overheads budgeted for the year:

Department	P1	₹25,50,000	S1	₹6,00,000
	P2	₹21,75,000	S2	₹4,50,000

Budgeted output in units:

Product A – 50,000; B – 30,000

Budgeted raw material cost per unit;

Product A – 120; B – 150.

Budgeted time required for production per unit;

Department P1:	Product – A: 1.5 machine hours
	Product – B : 1.0 machine hours
Department P2:	Product – A: 2 direct labours
	Product – B: 2.5 direct labours

Average wage rates budgeted in Department P2 are: Product A – ₹72 per hour and Product B – ₹75 per hour.

All material are used in Department P1 only.

Actual Data: (for the month of July)

Units actually produced:	Product A – 4,000 units
	Product B – 3,000 units

Actual direct machine hours worked in Department P1:

On Product A – 6,100 hours; Product B – 4,150 hours

Actual direct labour hours worked in Department P2:

On Product A – 8,200 hours; Product B – 7,400 hours

Costs actually incurred:			Product A		Product B
Raw materials:			₹4,89,000		₹4,56,000
Wages:			₹5,91,900		₹5,52,000
Overheads: Department	P1	₹2,31,000	S1	₹60,000	
	P2		₹2,04,000	S2	₹48,000

You are required to:

(a) Compute the predetermined overhead rate for each production department

(b) Prepare a performance report for July, that will reflect the budgeted costs and actual costs.

Ans. (a) ₹30 per machine hours; ₹15 per labour hour; (b) ₹25,71,000; ₹26,31,000.

PRACTICE QUESTIONS

25. Service department expenses are: **[SM]**

Boiler house	₹3,00,000
Pump Room	₹60,000
Total	₹3,60,000

The allocation basis is:

	Production Department		Service Department	
	A	**B**	**Boiler House**	**Pump Room**
Boiler House	60%	35%	-	5%
Pump Room	10%	40%	50%	-

Ans. ₹2,10,769; ₹1,49,231.

26. Suppose the expenses of two production departments A and B and two service departments X and Y are as under: **[SM]**

Department	Amount (₹)	Apportionment Basis		
		Y	**A**	**B**
Dept-X	2,00,000	25%	40%	35%
Dept-Y	1,50,000	-	40%	60%
Dept-A	3,00,000			
Dept-B	3,20,000			

Prepare a statement apportioning the costs of service departments over the production departments using step method.

Ans. ₹4,60,000; ₹5,10,000.

27. SK Ltd. has three production departments P1, P2 and P3 and two service departments S1 and S2. The following data are extracted from the records of the Company for the month of October: **[SM, Similar Nov 2020, Similar RTP May 2020]**

	₹
Rent and rates	62,500
General lighting	7,500
Indirect Wages	18,750
Power	25,000

	₹
Depreciation on machinery	50,000
Insurance of machinery	20,000

Other information:

	P1	P2	P3	S1	S2
Direct Wages (₹)	37,500	25,000	37,500	18,750	6,250
Horse power of machine used	60	30	50	10	--
Cost of machinery (₹)	3,00,000	4,00,000	5,00,000	25,000	25,000
Floor Space (Sq. Ft.)	2,000	2,500	3,000	2,000	500
Number of light points	10	15	20	10	5
Production hours worked	6,225	4,050	4,100	--	--

Expenses of the service departments, S1 and S2 are reapportioned as below:

	P1	P2	P3	S1	S2
S1	20%	30%	40%	-	10%
S2	40%	20%	30%	10%	-

Required:

(a) Compute overhead rate per production hour of each production department

(b) Determine the total cost of product X which is processed for manufacture in department P1, P2 and P3 for 5 hours, 3 hours and 4 hours respectively, given that its direct material cost is ₹625 and direct labour cost is ₹375.

Ans. (a) ₹9.75; ₹15.78; ₹20.52; (b) ₹1,178.17.

28. SK Company has the following account balances and distribution of direct charges on 31st March, 2021. **[RTP – May 2019]**

	Total	Production Dept.		Service Dept.	
		Machine shop	Packing	Gen. Plant	Stores
Allocated Overheads:	(₹)	(₹)	(₹)	(₹)	(₹)
Indirect labour	29,000	8,000	6,000	4,000	11,000
Maintenance material	9,900	3,400	1,600	2,100	2,800
Misc. supplies	5,900	1,500	2,900	900	600
Superintendent's salary	16,000	-	-	16,000	-
Cost & payroll salary	80,000	-	-	80,000	-

Overheads to be apportioned:

Power	78,000
Rent	72,000
Fuel and Heat	60,000
Insurance	12,000
Taxes	8,400
Depreciation	1,20,000

The following data were compiled by means of the factory survey made in the previous year:

	Floor Space (sq. ft.)	Radiator Sections	No. of Employees	Investment	H.P. hours
Machine shop	2,000	45	20	8,00,000	3,500
Packing	800	90	12	2,40,000	500
General Plant	400	30	4	80,000	-
Stores & Maintenance	1,600	60	8	1,60,000	1,000

Expenses charged to the stores and maintenance departments are to be distributed to the other departments by the following percentages:

Machine shop 50%; Packing 20%; General Plant 30%;

General Plant overheads is distributed on the basis of number of employees.

(a) Prepare an overhead distribution statement with supporting schedules to show computations and basis of distribution.

(b) Determine the service department distribution by simultaneous equation method.

Ans. (a) ₹1,97,250; ₹80,625; ₹1,25,775; ₹87,550; (b) ₹3,38,071; ₹1,53,129.

29. SNS Trading Company has three Main Departments and two Service Departments. The data for each department is given below:

Departments	Expenses (₹)	Area (in Sq. Mtr.)	Number of employees
Main Department:			
Purchase Department	5,00,000	12	800
Packing Department	8,00,000	15	1700
Distribution Department	3,50,000	7	700
Service Department:			
Maintenance Department	6,40,000	4	200
Personnel Department	3,20,000	6	250

The cost of Maintenance Department and Personnel Department is distributed on the basis of 'Area in Square Meters' and 'Number of Employees' respectively:

You are required to:

(i) Prepare a statement showing the distribution of expenses of service departments to the main departments using the "Step Ladder Method" of overhead distribution.

(ii) Compute the rate per hour of each Main Department, given that, the Purchase Department, Packing Department and Distribution Department works for 12 hours a day, 24 hours a day and 8 hours a day respectively. Assume that there are 365 days in a year and there are no holidays.

Ans. (i) ₹7,96,000; ₹12,61,000; ₹5,53,000; (ii) ₹181.74; ₹143.95; ₹189.38.

30. SK Ltd. manufactures luggage trolleys for airports. The factory, in which the company undertakes all of its production, has two production departments- 'Fabrication' and 'Assembly', and two service departments- 'Stores' and 'Maintenance'. The following information have been extracted from the company's budget for the financial year ended 31st March: **[MTP – Nov 2019]**

Allocated Overhead Costs	₹
Fabrication Department	15,52,000
Assembly Department	7,44,000
Stores Department	2,36,000
Maintenance Department	1,96,000
Other Overheads	₹
Factory rent	15,28,000
Factory building insurance	1,72,000
Plant & machinery insurance	1,96,000
Plant & Machinery Depreciation	2,65,000
Subsidy for staffs' canteen	4,48,000

Direct Costs	₹	₹
Fabrication Department:		
Material	63,26,000	
Labour	8,62,000	71,88,000
Assembly Department:		
Material	1,42,000	
Labour	13,06,000	14,48,000

The following additional information is also provided:

	Fabrication Department	Assembly Department	Stores Department	Maintenance Department
Floor area (square meters)	24,000	10,000	2,500	3,500
Value of plant & machinery (₹)	16,50,000	7,50,000	75,000	1,75,000
No. of stores requisitions	3,600	1,400	---	---
Maintenance hours required	2,800	2,300	400	---
No. of employees	120	80	38	12
Machine hours	30,00,000	60,000		
Labour hours	70,000	26,00,000		

Required:

(a) Prepare a table showing the distribution of overhead costs of the two service departments to the two production departments using step method; and

(b) Calculate the most appropriate overhead recovery rate for each department.

(c) Using the rates calculated in part (b) above, calculate the full production costs of the following job order:

Job number IGI2019

Direct Materials	₹2,30,400
Direct Labour:	
Fabrication Department	240 hours @ ₹50 per hour
Assembly Department	180 hours @ ₹50 per hour
Machine hours required:	
Fabrication Department	210 hours
Assembly Department	180 hours

Ans. (a) ₹36,01,649; ₹17,35,351; (b) ₹1.20 per machine hour; ₹0.67 per labour hour; (c) ₹2,51,773.

31. SK Ltd. is an online book retailer. They have four departments. The two sales departments are Corporate Sales and Consumer Sales. The two support-departments are Administrative (Human resources, Accounting), and Information Systems. Each of the sales departments conducts merchandising and marketing operations independently.

The following data are available for October:

Departments	Revenues	No. of Employees	Processing Time used (in minutes)
Corporate Sales	₹16,67,750	42	2,400
Consumer Sales	₹8,33,875	28	2,000
Administrative	–	14	400
Information Systems	–	21	1,400

Cost incurred in each of four departments for October, 2018 are as follows:

Departments	₹
Corporate Sales	12,97,751
Consumer Sales	6,36,818
Administrative	94,510
Information Systems	3,04,720

The company uses number of employees as basis to allocate administrative costs and processing time as a basis to allocate Information Systems costs.

Required:

(i) Allocate the support department costs to the sales departments using the direct method.

(ii) Rank the support departments based on percentage of their services rendered to other support departments. Use this ranking to allocate support costs based on the step-down allocation method.

(iii) How could you have ranked the support departments differently?

(iv) Allocate the support department costs to two sales departments using the reciprocal allocation method.

Ans. (i) ₹15,20,668; ₹8,13,131; (ii) ₹15,19,478; ₹8,14,321; (iii) ₹15,20,641; ₹8,13,158.

32. From the details furnished below you are required to compute a comprehensive machine-hour rate: **[MTP – May 2019]**

Original purchase price of the machine (subject to depreciation at 10% p.a. on original cost)	₹3,24,000
Normal working hours for the month (The machine works to only 75% of capacity)	200 hours
Wages of Machine man	₹125 per day of 8 hours
Wages for helper (machine attendant)	₹75 per day of 8 hours
Power cost for the month worked	₹15,000
Supervision charges apportioned for the machine center for the month	₹3,000
Electricity & lighting for the month	₹7,500
Repairs & maintenance (machine) including consumable stores per month	₹17,500
Insurance of Plant & Building (apportioned) for the year	₹16,250
Other general expense per annum	₹27,500

The workers are paid a fixed Dearness allowance of ₹1,575 per month. Production bonus payable to workers in terms of an award is equal to 33.33% of basic wages and dearness allowance. Add 10% of the basic wage and dearness allowance against leave wages and holidays with pay to arrive at a comprehensive labour-wage for debit to production.

Ans. ₹406.85.

33. A machine shop cost centre contains three machines of equal capacities. **[SM, MTP May 2018]**

Three operators are employed on each machine, payable ₹20 per hour each. The factory works for forty-eight hours in a week which includes 4 hours setup time. The work is jointly done by operators. The operators are paid fully for the forty-eight hours. In addition, they are paid a bonus of 10 per cent of productive time. Costs are reported for this company on the basis of thirteen four-weekly period.

The company for the purpose of computing machine hour rate includes the direct wages of the operator and also recoups the factory overheads allocate to the machines. The following details of factory overheads applicable to the cost centre are available:

Depreciation 10% per annum on original cost of the machine. Original cost of each machine is ₹52,000.

Maintenance and repairs per week per machine is ₹60.

Consumable stores per week per machine are ₹75.

Power: 20 units per hour per machine at the rate of 80 paise per unit

Apportionment to the cost centre: Rent per annum ₹5,400, Heat and Light per annum ₹9,720 and foreman's salary per annum ₹12,960 and other miscellaneous expenditure per annum ₹18,000.

Required:

(a) Calculate the cost of running one machine for a four-week period.

(b) Calculate the machine hour rate.

Ans. (a) ₹17,513.54; (b) ₹99.51.

34. M/s SK Private Limited has purchased a machine costing ₹29,14,800 and its is expected to have a salvage value of ₹1,50,000 at the end of its effective life of 15 years. Ordinarily the machine is expected to run for 4,500 hours per annum but it is estimated that 300 hours per annum will be lost for normal repair & maintenance. The other details in respect of the machine are as follows: **[May 2019]**

Repair & Maintenance during the whole life of the machine are expected to be ₹5,40,000.
Insurance premium (per annum) 2% of the cost of the machine
Oil and Lubricants required for operating the machine (per annum) ₹87,384
Power consumptions: 10 units per hour @ ₹7 per unit. No power consumption during repair and maintenance.
Salary to operator per month ₹24,000. The operator devotes one third of his time to the machine.
You are required to calculate comprehensive machine hour rate.

Ans. ₹180

35. A manufacturing company has added a new machine to its fleet of eleven existing machines. New machine is purchased for ₹12,70,000 with installation cost of ₹40,000. The machine has an estimated life of 10 years and is expected to realize ₹90,000 as scrap at the end of its useful life. Other relevant data are as follows: **[May 2019]**
Budgeted annual working hours are 2,400 based on 8 hours per day for 300 days. This includes 180 hours for plant maintenance and 120 hours of productive set-up time.
Electricity used by the new machine is 12 units per hour at a cost of ₹6.50 per unit. No current is drawn during maintenance and setup.
Three operators control the operations of all the twelve machines and average rate of wages per operator per day is ₹600 and production bonus is 10% of wages.
Annual insurance premium for the new machine is ₹12,600
Annual maintenance cost of new machine including consumable stores is ₹32,500
Rent of the factory is ₹24,000 per month. Area occupied by new machine 200 sq. ft. and area occupied by other machines is 2,800 sq. ft.
Required: Compute the comprehensive machine hour rate.

Ans. ₹180

36. A machine costing ₹1,00,00,000 is expected to run for 10 years. At the end of this period its scrap value is likely to be ₹9,00,000. Repairs during the whole life of the machine are expected to be ₹18,00,000 and the machine is expected to run 4,380 hours per year on the average. Its electricity consumption is 15 units per hour, the rate per unit being ₹5. The machine occupies one-fourth of the area of the department and has two points out of a total of ten for lighting. The foreman has to devote about one sixth of his time to the machine. The monthly rent for the department is ₹30,000 and the lighting charges amount to ₹8,000 per month. The foreman is paid a monthly salary of ₹19,200. Find out the machine hour rate, assuming insurance is @1% p.a. and the expenses on oil etc. are ₹900 per month. **[SM]**

Ans. ₹382.85

37. A manufacturing unit has purchased and installed a new machine at a cost of ₹24,90,000 to its fleet of 5 existing machines. The new machine has an estimated life of 12 years and is expected to realize ₹90,000 as scrap value at the end of its working life. **[RTP – May 2021]**

Other relevant data are as follows:
Budgeted working hours are 2,496 based on 8 hours per day for 312 days. Plant maintenance work is carried out on weekends when production is totally halted. The estimated maintenance hours are 416. During the production hours machine set-up and change over works are carried

out. During the set-up hours no production is done. A total 312 hours are required for machine set-ups and change overs.

An estimated cost of maintenance of the machine is ₹2,40,000 p.a.

The machine requires a component to be replaced every week at a cost of ₹2,400.

There are three operators to control the operations of all the 6 machines. Each operator is paid ₹30,000 per month plus 20% fringe benefits.

Electricity: During the production hours including set-up hours, the machine consumes 60 units per hour. During the maintenance the machine consumes only 10 units per hour. Rate of electricity per unit of consumption is ₹6.

Department al and general works overhead allocated to the operation during last year was ₹5,00,000. During the current year it is estimated to increase by 10%.

Required to compute the machine hour rate.

Ans. 822.34

38. The following information are available for the three machines of a manufacturing department of KBC Ltd.: **[MTP May 2024]**

	Preliminary estimates of expenses (per annum)			
	Total	**Machines**		
	(₹)	P (₹)	Q (₹)	**R (₹)**
Depreciation	20,000	7,500	7,500	5,000
Spare parts	10,000	4,000	4,000	2,000
Power	40,000			
Consumable stores	10,000	4,000	3,000	3,000
Insurance of machinery	8,000			
Indirect labour	20,000			
Building maintenance expenses	20,000			
Annual interest on capital outlay	60,000	25,000	25,000	10,000
Monthly charge for rent and rates	10,000			
Salary of foreman (per month)	20,000			
Salary of Attendant (per month)	5,000			

(The foreman and the attendant control all the three machines and spend equal time on them).

The following additional information is also available:

	Machines		
	P	**Q**	**R**
Estimated Direct Labour Hours	1,00,000	1,50,000	1,50,000
Ratio of K.W. Rating	3	2	3
Floor Space (sq. ft.)	40,000	40,000	20,000

There are 14 holidays besides Sundays in the year, of which two were on Saturdays. The manufacturing department works 8 hours in a day but Saturdays are half days. All machines work at 85% capacity throughout the year and 2% is reasonable for breakdown.

You are required to:

Calculate predetermined machine hour rate for the above machines after taking into consideration the following factors:

- An increase of 15% in the price of spare parts
- An increase of 25% in the consumption of spare parts for machine 'Q' and 'R' only.
- 20% general increase in wage rates
- An 10% decrease in the consumption of consumable stores.

Ans. ₹107.17, ₹106.22, ₹90.13

39. Sree Ajeet Ltd. having fifteen different type of automatic machines furnishes information as under for 2018-2019. **[RTP – Nov 2018]**

Overhead expenses: Factory rent ₹1,80,000 (floor area 1,00,000 sq. ft.), Heat and gas ₹60,000 and supervision ₹1,50,000

Wages of the operator are ₹200 per day of 8 hours. Operator attends to one machine when it is under set up and two machines while they are under operation.

In respect of machine B (one of the above machines) the following particulars are furnished:

Cost of machine ₹1,80,000, Life of machine – 10 years and scrap value at the end of its life ₹10,000

Annual expenses on special equipment attached to the machine are estimated as ₹12,000

Estimated operation time of the machine is 3,600 hours while set up time is 400 hours per annum.

The machine occupies 5,000 sq. ft. of floor area

Power cost ₹5 per hour while machine is in operation.

Estimate the comprehensive machine hour rate of machine B. Also find out machine costs to be absorbed in respect of used o machine B on the following two work orders

	Work order-1	Work order - 2
Machine set up time (Hours)	15	30
Machine operation time (Hours)	100	190

Ans. ₹3,620; ₹6,935

40. SK Ltd. manufactures a single product. It recovers factory overheads at a pre-determined rate of ₹20 per man-day. **[Dec 2021, Similar Nov 2019]**

During the year 2020-21, the total factory overheads incurred and the man-days actually worked were ₹35.50 lakhs and 1.50 lakh days respectively. Out of the amount of ₹35.50 lakhs, ₹2.00 lakhs were in respect of wages for strike period and ₹1.00 lakh was in respect of expenses of previous year booked in the current year. During the period, 50,000 units were sold. At the end of the period, 12,000 completed units were held in stock but there was no opening stock of finished goods. Similarly, there was no stock of uncompleted units at the beginning of the period but at the end of the period there were 20,000 uncompleted units which may be treated as 65% complete in all respects.

On investigation, it was found that 40% of the unabsorbed overheads were due to factory inefficiency and the rest were attributable to increase in the cost of indirect materials and indirect labour. You are required to:

(i) Calculate the amount of unabsorbed overheads during the year 2020-21.

(ii) Show the accounting treatment of unabsorbed overheads in cost accounts and pass journal entry.

Ans. (i) Under recovery ₹2,50,000.

41. SK engineering factory fabricates machine parts to customers. The factory commenced fabrication of 12 Nos. machine parts to customer's specifications and the expenditure incurred on the job for the week ending 21st August, is given below: **[SM]**

	(₹)	(₹)
Direct materials (all items)		78.00
Direct labour (manual) 20 hours @ ₹1.50 per hour		30.00
Machine facilities:		
Machine No. I : 4 hours @ ₹4.50	18.00	
Machine No. II: 6 hours @ ₹6.50	39.00	57.00
Total		165.00
Overheads @ ₹0.80 per hour on 20 manual hours		16.00
Total cost		181.00

The overhead rate of ₹0.80 per hour is based on 3,000 man hours per week; similarly, the machine hour rates are based on the normal working of Machine Nos. I and II for 40 hours out of 45 hours per week.

After the close of each week, the factory levies a supplementary rate for the recovery of full overhead expenses on the basis of actual hours worked during the week. During the week ending 21st August, the total labour hours worked was 2,400 and machine Nos. I and II had worked for 30 hours and 32½ hours respectively.

Prepare a cost sheet for the job for the fabrication of 12 Nos. machine parts duly levying the supplementary rates.

Ans. Total cost ₹200.

42. A factory has three production departments. The policy of the factory is to recover the production overheads of the entire factory by adopting a single blanket rate based on the percentage of total factory overheads to total factory wages. The relevant data for a month are given below: **[SM]**

Department	Direct Material	Direct Wages	Direct Overheads	Direct Labour Hours	Machine Hours
Budgeted:					
Machine	6,50,000	80,000	3,60,000	20,000	80,000
Assembly	1,70,000	3,50,000	1,40,000	1,00,000	10,000
Packing	1,00,000	70,000	1,25,000	50,000	-
Actual:					
Machining	7,80,000	96,000	3,90,000	24,000	96,000
Assembly	1,36,000	2,70,000	84,000	90,000	11,000

Department	Direct Material	Direct Wages	Direct Overheads	Direct Labour Hours	Machine Hours
Packing	1,20,000	90,000	1,35,000	60,000	-

The details of one of the representative jobs produced during the month are as under:

Department	Direct Material	Direct Wages	Direct Labour Hours	Machine Hours
Machine	1,200	240	60	180
Assembly	600	360	120	30
Packing	300	60	40	-

The factory adds 30% on the factory cost to cover administration and selling overheads and profit.

Required:

(i) Calculate the overhead absorption rate as per the current policy of the company and determine the selling price of Job

(ii) Suggest any suitable alternative method(s) of absorption of the factory overheads and calculate the overhead recovery rates based on the method(s) so recommended by you.

(iii) Determine the selling price of job based on the overhead application rates calculated in (ii) above.

(iv) Calculate the department wise and total under or over recovery of overheads based on the Company's current policy and the method(s) recommended by you.

Ans. (i) SP = ₹4,660.50; (iii) ₹4,989.40; (iv) Under recover ₹39,000 and over recovery ₹99,000.

43. Based on the data below, what is the amount of the overhead under-/over absorbed?

[MTP May 24]

Budgeted overhead – ₹5,25,000
Budgeted machine hours- 17,500
Actual machine hours- 17,040
Actual overheads- ₹5,20,000
A. 5,000 under-absorbed
B. 8,800 under-absorbed
C. 8,800 over-absorbed
D. 5,000 over-absorbed

Ans. (c) 8800 over-absorbed

44. During half year ending inter departmental review meeting of P Ltd., cost variance report was discussed and the performance of the departments were assessed. The following figures were presented.

For a period of first six months of the financial year, following information were extracted from the books:

Actual production overheads ₹34,08,000

The above amount is inclusive of the following payments made:

Paid as per court's order ₹4,50,000

Expenses of previous year booked in current year	₹1,00,000
Paid to workers for strike period under an award	₹4,20,000
Obsolete stores written off	₹36,000

Production and sales data for the six months are as under:

Production

Finished goods	1,10,000 units
Works-in-progress	
(50% complete in every respect)	80,000 units
Sale:	
Finished goods	90,000 units

Machine worked during the period was 3,000 hours.

At the of preparation of revenue budget, it was estimated that a total of ₹50,40,000 would be required for budgeted machine hours of 6,000 as production overheads for the entire year.

During the meeting, a data analytic report revealed that 40% of the over/under-absorption was due to defective production policies and the balance was attributable to increase in costs.

You were also present at the meeting; the chairperson of the meeting has asked you to be ready with the followings for the performance appraisal of the departmental heads:

(i) How much was the budgeted machine hour rate used to recover overhead?

(a) ₹760 (b) ₹820 (c) ₹780 (d) ₹840

(ii) How much amount of production overhead has been recovered (absorbed) upto the end of half year end?

(a) ₹25,20,000 (b) ₹34,08,000 (c) ₹24,00,000 (d) ₹24,60,000

(iii) What is the amount of overhead under/ over absorbed?

(a) 1,18,000 over-absorbed (b) 1,18,000 under- absorbed

(c) 18,000 over-absorbed (d) 18,000 under-absorbed

(iv) What is the supplementary rate for apportionment of over/under absorbed overheads over WIP, Finished goods and Cost of sales?

(a) ₹0.315 per unit (b) ₹0.472 per unit

(c) ₹0.787 per unit (d) ₹1 per unit

(v) What is the amount of over/under absorbed overhead apportioned to Work in Progress?

(a) ₹9,440 (b) ₹42,480 (c) ₹18,880 (d) ₹70,800

Ans. (i) - (d), (ii) - (a), (iii) - (a), (iv) - (b), (v) - (c)

SOLUTION OF PRACTICE QUESTIONS

25. Statement of Overhead Distribution

Particulars	Basis	Production Department		Service Department	
		Dept A	Dept B	Boiler	Pump
Expenses		-	-	3,00,000	60,000
Boiler House expenses	60:35:5	2,03,077	1,18,462	(3,38,462)	16,923
Pump room expenses	10:40:50	7,692	30,769	38,462	(76,923)
Total		**2,10,769**	**1,49,231**	**-**	**-**

Working note – 1

Let D = Total expenses of Boiler house to be apportioned

Let E = Total expenses of pump room to be apportioned

Thus, D = 3,00,000 + (0.5)E

E = 60,000 + (0.05)D

Solving above equations, we get, D = 3,38,462 and E = 76,923

26. Statement of Overhead Distribution

Particulars	Basis	Production Department		Service Department	
		Dept A	Dept B	Dept X	Dept Y
Amount as given		3,00,000	3,20,000	2,00,000	1,50,000
Expenses of Dept X	40:35:25	80,000	70,000	(2,00,000)	50,000
Expenses of Dept Y	40:60	80,000	1,20,000	-	(2,00,000)
Total		**4,60,000**	**5,10,000**	**-**	**-**

27. Overheads Distribution Summary

Item of Cost	Basis of Apportionment	P1 (₹)	P2 (₹)	P3 (₹)	S1 (₹)	S2 (₹)
Direct Wages	Allocation	—	—	—	18,750	6,250
Rent and Rates	loor Area (4:5:6:4:1)	12,500	15,625	18,750	12,500	3,125
General Lighting	Light Point (2:3:4:2:1)	1,250	1,875	2,500	1,250	625
Indirect Wages	Direct Wages (6:4:6:3:1)	5,625	3,750	5,625	2812.5	937.5
Power	H.P. of Machines (6:3:5:1)	10,000	5,000	8,333	1,667	—
Dep. of Machine	Value-Machine (12:16:20:1:1)	12,000	16,000	20,000	1,000	1,000

Insurance of Machine	Value-Machine (12:16:20:1:1)	4,800	6,400	8,000	400	400
		46,175	48,650	63,208	38,380	12,338
Cost of Dept. S1	Apportioned	8,003	12,004	16,006	(40,014)	4,001
Cost of Dept. S2	Apportioned	6,536	3,268	4,901	1,634	(16,339)
		60,714	63,922	84,115	—	—
Prod. Hrs Worked		6,225	4,050	4,100	—	—
Rate per Hour (₹)		9.75	15.78	20.52	—	—

Overheads of service cost centres Let S1 be the overhead of service cost centre S1 and S2 be the overheads of service cost centre S2.

S1 = 38,380 + 0.10 S2

S2 = 12,338 + 0.10 S1

Substituting the value of S2 in S1 we get

S2 = 38,380 + 0.10 (12,338 + 0.10 S1)

S1 = 38,380 + 1233.8 + 0.01 S1

0.99 S1 = 39,613.8

∴ S1 = ₹40,014

∴ S2= 12,338 + 0.10 × 40,014 = ₹16339.4

Cost of Product X	(₹)
Direct Material	625.00
Direct Labour	375.00
Prime Cost	1,000.00
Production on Overheads	
P1 5 hours × ₹9.75 = 48.75	
P2 3 hours × ₹15.78 = 47.34	
P3 4 hours × ₹20.52 = 82.08	178.17
Factory Cost	1,178.17

28. (a) Statement of Apportionment of Overheads

Expenses	Basis	Production Department		Service Department	
		Machine Shop (₹)	Packing (₹)	General Plant (₹)	Stores & Maint. (₹)
Indirect labour	Allocation	8,000	6,000	4,000	11,000
Maintenance material	Allocation	3,400	1,600	2,100	2,800
Superintendent's salary	Allocation	-	-	16,000	-
Misc. supplies	Allocation	1,500	2,900	900	600
Cost & payroll salaries	Allocation	-	-	80,000	-
Total	**-**	**12,900**	**10,500**	**1,03,000**	**14,400**
Power	H.P. hours	54,600	7,800	-	15,600

Rent	Floor space	30,000	12,000	6,000	24,000
Fuel & Heat	Radiator secs.	12,000	24,000	8,000	16,000
Insurance	Investment	7,500	2,250	750	1,500
Taxes	Investment	5,250	1,575	525	1,050
Depreciation	Investment	75,000	22,500	7,500	15,000
Total		**1,97,250**	**80,625**	**1,25,775**	**87,550**

(b) Distribution of Service department expenses

Expenses	Production Department		Service Department	
	Machine Shop (₹)	Packing (₹)	General Plant (₹)	Stores (₹)
Total expenses [as per (a)]	1,97,250	80,625	1,25,775	87,550
Exp. Of general plant (1,61,745 in 20:12:8)	80,872	48,524	(1,61,745)	32,349
Exp. of stores & maintenance (1,19,899 in 50:20:30)	59,949	23,980	35,970	(1,19,899)
Total	**3,38,071**	**1,53,129**	**-**	**-**

Let the total overheads of General Plant = 'a' and the total overheads of Stores = 'b'

a = 1,25,775 + 0.3b ...(i)

b = 87,550 + 0.2a ...(ii)

Putting the value of 'b' in equation no. (i)

a = 1,25,775 + 0.3(87,550 + 0.2a)

a = 1,25,775 + 26,265 + 0.06a

0.94a = 1,52,040

a = 1,61,745

Putting the value of a in equation (ii)

b = 87,550 + (0.2×1,61,745) = 1,19,899

29. (i) & (ii) Overheads Distribution Sheet

Particulars	Basis	Main Department				Service Department
		Purchase	Packing	Distribution	Maintenance	Personnel
Expenses	Allocation	5,00,000	8,00,000	3,50,000	6,40,000	3,20,000
Maintenance Department Expenses	Area (12:15:7:6)	1,92,000	2,40,000	1,12,000	(6,40,000)	96,000
Personnel Department Expenses	No. of Ees (8:17:7)	1,04,000	2,21,000	91,000	-	(4,16,000)
Total		7,96,000	12,61,000	5,53,000	-	-

Total Hours		12 × 365 = 4,380	24 × 365 = 8,760	8 × 365 = 2,920	-	-
Rate per hour		181.74	143.95	189.38	-	-

Working Note - 1

	Main Department			Service Department	
	Purchase	**Packing**	**Distribution**	**Maintenance**	**Personnel**
Area (in sq. mtr.)	12	15	7	-	6
% of service rendered by Maintenance Department	30%	37.50%	17.50%	-	15%
Number of Employees	800	1700	700	200	-
% of service rendered by Personnel department	23.53%	50%	20.59%	5.88%	

The usual method used for ranking the support departments for Step Down Allocation Method is % of Service rendered by one Service Department to another. Based on this, Maintenance Department provides 15% (highest %) of service to Personnel Department. Thus, first maintenance department expenses should be distributed first.

30. (a) Table of Primary Distribution of Overheads

Particulars	Basis of Apportionment	Total Amount	Production Dept.		Service Depart.	
			Fabrication	Assembly	Stores	Maintenance
OHs Allocated	Allocation	27,28,000	15,52,000	7,44,000	2,36,000	1,96,000
Direct Costs	Actual	-	-	-	---	---
Other OHs:						
Factory rent	Floor Area (48:20:5:7)	15,28,000	9,16,800	3,82,000	95,500	1,33,700
Factory bldg.. insurance	Floor Area (48:20:5:7)	1,72,000	1,03,200	43,000	10,750	15,050
P&M insurance	Value of P&M (66:30:3:7)	1,96,000	1,22,038	55,472	5,547	12,943
P&M Dep.	Value of P&M (66:30:3:7)	2,65,000	1,65,000	75,000	7,500	17,500
Canteen Subsidy	No. of employees (60:40:19:6)	4,48,000	2,15,040	1,43,360	68,096	21,504
		53,37,000	30,74,078	14,42,832	4,23,393	3,96,697

Re-distribution of Service Departments' Expenses:

Particulars	Basis of Apportionment	Production Department		Service Departments	
		Fabrication	Assembly	Stores	Maintenance
OH as per Primary distribution	Primary distribution	30,74,078	14,42,832	4,23,393	3,96,697
Maint. Depart. Cost	Maintenance Hours (28:23:4)	2,01,955	1,65,891	28,851	(3,96,697)
		32,76,033	**16,08,723**	**4,52,244**	**---**
Stores Department	No. of Stores Requisition (18:7)	3,25,616	1,26,628	(4,52,244)	
		36,01,649	**17,35,351**	---	---

(b) Overhead Recovery Rate

Department	Apportioned Overhead (₹)	Basis of Overhead Recovery Rate	Overhead Recovery Rate (₹)
	(I)	(II)	[(I)÷(III)]
Fabrication	36,01,649	30,00,000 Machine Hours	1.20 per Machine Hour
Assembly	17,35,351	26,00,000 Labour Hours	0.67 per Labour Hour

(c) Calculation of full production costs of Job no. IGI2014.

Particulars	Amount (₹)
Direct Materials	2,30,400
Direct Labour:	
- Fabrication Deptt. (240 hours × ₹50)	12,000
-Assembly Deptt. (180 hours × ₹50)	9,000
Production Overheads:	
- Fabrication Deptt. (210 hours × ₹1.20)	252
- Assembly Deptt. (180 hours × ₹0.67)	121
Total Production Cost	**2,51,773**

31. (*a*) Overheads Distribution Sheet (Direct Method)

Particulars	Basis	Sales Department		Support Department	
		Corporate	Consumer	Admin.	Inform.
Primary Distribution					
Factory OHs	Allocated	12,97,751	6,36,818	94,510	3,04,720
Secondary Distribution					
Administrative Department	42:28:00	56,706	37,804	(94,510)	-
Information Department	24:20:00	1,66,211	1,38,509	-	(3,04,720)
Total		**15,20,668**	**8,13,131**	**-**	-

(b) Determination of Ranking of support departments based on percentage of their services rendered for step down allocation method.

Particulars	Sales Department		Support Department	
	Corporate	Consumer	Admin.	Inform.
No. of Employees	42/91	28/91	-	21/91
% of service rendered by Administrative Department (Rank – I)	46.15%	30.77%	-	23.08%
Processing time used	2400	2000	400	-
% of service rendered (Rank – II)	50%	41.67%	8.33%	-

Overheads Distribution Sheet (Step-Down Distribution Method)

Particulars	Basis	Sales Department		Support Department	
		Corporate	Consumer	Admin.	Inform.
Primary Distribution Total		12,97,751	6,36,818	94,510	3,04,720
% service rendered by costs					
(I) Admin. Department	42:28:21	43,620	29,080	(94,510)	21,810
(II) Info. System Dept.	24:20	1,78,107	1,48,423	-	(3.26,530)
Total		**15,19,478**	**8,14,321**	**-**	-

(c) The usual method used for ranking the support departments for Step Down Allocation Method is % of Service rendered by one Service Department to another. However, another method of ranking can also be used which is the amount of cost of service rendered.

Particulars	Admin.	Info. System
Cost of service rendered		
Admin. Deptt. (94,510 × 23.08%)	-	21,813 (Rank II)
Info. System (3,04,720 × 8.33%)	25,383 (Rank I)	-

(d) Let the total cost of administrative department be 'a'
Let the total cost of Information System be 'b'
a = 94,510 + 0.0833b
b = 3,04,720 + 0.2308a
Solving the above equations:
a = 1,22,215 & b = 3,32,923

Particulars	Basis	Sales Department		Support Department	
		Corporate	Consumer	Admin.	Inform.
Primary Distribution Total		12,97,751	6,36,818	94,510	3,04,720
Administrative Department	46.15%:30.77%:23.08%	56,407	3,87,605	(1,22,215)	28,203
Info. System Dept.	50:41.67:8.33	1,66,483	1,38,735	27,705	(3,32,932)
Total		15,20,641	8,13,158	-	-

32. Effective machine hours = 200 × 75% = 150
Statement of Machine Hour Rate

Particulars	Amount (₹)
Fixed Expenses	
Depreciation [3,24,000 × 10% × (1/12)]	2,700
Total wages of machine man (working note – 1)	6,737
Total wages of helper (working note – 1)	4,945
Supervision charges	3,000
Electricity and lighting charges	7,500
Repair & Maintenance charges	17,500
Insurance of plant & building (16,250 ÷ 12)	1,354
Other general expenses (27,500 ÷ 12)	2,292
Fixed expenses	46,028
Effective machine hours	150
Fixed expenses per machine hour	306.85
Variable Expenses per machine hour	
Power $\left(\frac{15,000}{150}\right)$	100
Machine hour rate	406.85

Working Note – 1

Particulars	Total wages Machine man	Total wages Helper
Wages	(125/8) × 200 = 3,125	(75/8) × 200 = 1,875
Dearness allowance	1,575	1,575
(A)	4,700	3,450
(+) Production bonus (A ÷ 3)	1,567	1,150

(+) Leave Wages (A × 10%)	470	345
Total Wages	**6,737**	**4,945**

33. Effective machine hours = (48 × 4) – (4 × 4) = 176 hours

Computation of cost of running one machine for a four week period

Fixed charges of the machine shop	**Per Annum**
Rent	5,400
Heat and light	9,720
Forman's salary	12,960
Other miscellaneous expenditure	18,000
	46,080
Fixed expenses of the machine shop for one machine for four-week $\left(\frac{46,080}{3}\times\frac{4}{52}\right)$	₹1,1821.54
Depreciation $\left(52,000 \times 10\% \times \frac{4}{52}\right)$	400
Total Fixed Expenses (A)	1,581.54
Variable Expenses:	
Wages (48 × 4 × 20 × 3)	11,520
Bonus [((48 × 4) – 16) × 20 × 10% × 3]	1,056
Repairs and maintenance (60 × 4)	240
Consumable stores (75 × 4)	300
Power (192 – 16) = 176 × 20 units × 0.80	2,816
Total Variable Expenses (B)	15,932
Total Expenses (A + B)	17,513.54

Machine hour rate = $\frac{17,513.54}{176}$ = ₹99.51

34. Effective machine hours = 4,500 – 300 = 4,200

Statement of Machine hour Rate

Particulars	Amount (₹)
Fixed Expenses:	
Repair & Maintenance (5,40,000 ÷ 15)	36,000
Depreciation $\left(\frac{29,14,800-1,50,000}{15}\right)$	1,84,320
Insurance (29,14,800 × 2%)	58,296
Oil and Lubricant	87,384
Salary to operator (24,000 × 12 × 1/3)	96,000
Total Fixed Expenses	4,62,000
Effective Machine hours	4,200
Fixed cost per machine hour	110
Machine Expenses:	
Power (10 × 7)	70
Machine Hour Rate	**180**

35.

Effective machine hours = 2,400 – 180 = 2,220 hours

Electricity consumption hours = 2,400 – 180 – 120 = 2,100 hours

Statement of Machine Hour Rate

Particulars	Amount (₹)
Fixed Expenses	
Depreciation $\left(\frac{12,70,000+40,000-90,000}{10}\right)$	1,22,000
Operator wages $\left(\frac{3\times600\times300}{12}\right)$	45,000
Production Bonus (45,000 × 10%)	4,500
Insurance premium	12,600
Maintenance cost	32,500
Rent of factory $\left(\frac{24,000\times12}{2,800+200}\times200\right)$	19,200
Fixed expenses	2,35,800
Effective machine hours	2,220
Fixed expenses per machine hour	106.22
Variable Expenses per machine hour	
Electricity $\left(\frac{12\times6.50\times2,100}{2,220}\right)$	73.78
Machine hour rate	180.00

Solution – 36

36. Effective machine hours = 4,380 hours

Statement of Machine Hour Rate

Particulars	Amount (₹)
Fixed Expenses	
Depreciation $\left(\frac{1,00,00,000-9,00,000}{10}\right)$	9,10,000
Rent (30,000 × 12 × ¼)	90,000
Lighting charges (8,000 × 12 × 2/10)	19,200
Foreman salary (19,200 × 12 × 1/6)	38,400
Insurance (1,00,00,000 × 1%)	1,00,000

Sundry expenses (900 × 12)	10,800
Fixed expenses(A)	11,68,400
Variable Expenses	
Electricity (15 × 5 × 4,380)	3,28,500
Repairs $\left(\frac{18,00,000}{10}\right)$	1,80,000
Variable expenses (B)	5,08,500
Total expenses (A+B)	16,76,900
Effective machine hours	4,380
Machine hour rate	382.85

37. Effective machine hours = 2,496 – 312 = 2,184 hours

Statement of Machine Hour Rate

Particulars	Amount (₹)
Fixed Expenses	
Depreciation $\left(\frac{24,90,000-90,000}{12}\right)$	2,00,000
Operator's Salary $\left(\frac{30,000\times12\times3}{6}\right)$	1,80,000
Fringe benefits (1,80,000 × 20%)	36,000
Departmental and general overheads (5,00,000 × 110% × 1/6)	91,667
Fixed expenses(A)	5,07,667
Variable Expenses	
Electricity [(2,496 × 60 × 6) + (416 × 10 × 6)]	9,23,520
Component replacement cost (2,400 × 52)	1,24,800
Machine maintenance cost	2,40,000
Variable expenses (B)	12,88,320
Total expenses (A+B)	17,95,987
Effective machine hours	2,184
Machine hour rate	822.34

38. **Statement of Machine Hour Rate**

Particulars	Basis	P (₹)	Q (₹)	R (₹)
Standing Charges				
Insurance	Depreciation basis	3,000	3,000	2,000
Indirect labour (20,000 + 20% = 24,000)	Direct labour	6,000	9,000	9,000
Building Maintenance	Floor Space	8,000	8,000	4,000
Rent & Rates	Floor Space	48,000	48,000	24,000
Salary of Foreman	Equal	80,000	80,000	80,000

Salary of attendant	Equal	20,000	20,000	20,000
Total Standing charges (A)		**1,65,000**	**1,68,000**	**1,39,000**
Machine Expenses				
Depreciation	Direct	7,500	7,500	5,000
Spare parts	Final estiamtes	4,600	5,750	2,875
Power	KW Rating	15,000	10,000	15,000
Consumable stores (10,000 – 10% = 9,000)	Direct	3,600	2,700	2,700
Total Machine Expenses (B)		**30,700**	**25,950**	**25,575**
Total Expenses (A + B = C)		1,95,700	1,93,950	1,64,575
Effective Machine hours (D)		1,826	1,826	1,826
Machine Hr. Rate (C÷D)		**107.17**	**106.22**	**90.13**

Working note – 1

Number of days in a year	=	365
Less: Sunday	=	52
Less: Holidays	=	14
Less: Saturday (52 – 2)	=	50
Full working days	=	249
Hours on full working days (249 × 8)	=	1,992
Hours on half days (50 × 4)	=	200
Total hours	=	2,192
Effective hours at 85% level	=	1,863
Less: Normal loss @2%	=	37
Effective running hours	=	1,826

Working note – 2

Particulars	P	Q	R
Preliminary estimates of Spare parts	4,000	4,000	2,000
(+) Increase in price @15%	600	600	300
	4,600	4,600	2,300
(+) Increase in consumption@25%	-	1,150	575
Estimated Cost	4,600	5,750	2,875

Working note – 3

Interest on capital outlay is a financial matter and, therefore it has been excluded from the cost accounts.

39. Statement showing machine hours rate of Machine B

Particulars	₹
Standing Charges:	
Factory rent [(1,80,000 ÷ 1,00,000) × 5,000]	9,000

Particulars	₹
Heat and Gas (60,000 ÷ 15)	4,000
Supervision (1,50,000 ÷ 15)	10,000
Depreciation [(1,80,000 – 10,000) ÷ 10]	17,000
Annual expenses on special equipment	12,000
Total fixed expenses (A)	52,000
Total Machine hours (B)	4,000
Fixed cost per hour (A ÷ B)	13

Particulars	Set up rate per hour (₹)	Operation rate per hour (₹)
Fixed cost	13.00	13.00
Power	-	5.00
Wages	(200 ÷ 8) 25.00	$\left(\frac{200}{8}\times\frac{1}{2}\right)$ 12.50
Machine hour rate	**38.00**	**30.50**

Statement of cost of Work Order

Particulars	Work- Order – 1	Work Order - 2
Set up time cost	38×15 = 570	30×38 = 1,140
Operation time cost	100×30.5 = 3,050	190×30.5 = 5,795
Total cost	**3,620**	**6,935**

40. (i)

	Amount (₹)
Total production overheads actually incurred during the period	35,50,000
Less: Wages for strike period	2,00,000
Less: Expenses of previous year booked in current year	1,00,000
Net production overheads actually incurred	32,50,000
Less: Production overheads absorbed (1,50,000 × ₹20)	30,00,000
Under recovered overheads	2,50,000

(ii) As 40% of the under absorbed overheads i.e. ₹1,00,000 (₹2,50,000 × 40%) were due to factor inefficiency, this being abnormal, hence should be debited to profit and loss account.

Amount of balance under absorbed overheads = ₹2,50,000 – 1,00,000 = ₹1,50,000

Equivalent units = 50,000 + 12,000 + (20,000 × 65%) = 75,000

Supplementary rate = $\frac{1,50,000}{75,000 \text{ units}}$ = ₹2 per equivalent unit

	Equivalent Units	Amount (₹)
Work-in-progress (20,000 units × 65% × 2)	13,000	26,000
Finished stock (12,000 units × 2)	12,000	24,000
Cost of sales (50,000 units × 2)	50,000	1,00,000
Total	**75,000**	**1,50,000**

Journal Entry

Cost of Sales A/c	Dr.	1,00,000	
Finished goods ledger control A/c	Dr.	24,000	
Work-in-progress ledger control A/c	Dr.	26,000	
To Overheads control A/c			1,50,000
Costing P&L A/c	Dr.	1,00,000	
To Overheads Control A/c			1,00,000

41. Statement of Cost

Particulars	₹	₹
Material		78
Labour 20 hours @ ₹1.50		30
Machine facilities:		
Machine No. I: 4 hours @ ₹4.50	18	
Machine No. II: 6 hours @ ₹6.50	39	57
Overheads 20 hours @ ₹0.80 per hour		16
		181
Supplementary Rates		
Overheads 20 hours @ ₹0.20 per hour	4	
Machine facilities:		
Machine No. I: 4 hours @ ₹1.50	6	
Machine No. II: 6 hours @ ₹1.50	9	19
Total Cost		**200**

Working notes:

Overheads budgeted: 3,000 hours @ ₹0.80 = ₹2,400

Actual hours: 2,400 hours

Actual rate per hour ₹2,400/2,400 hours = ₹1

Supplementary charge ₹0.20 (₹1 – 0.80) per hour

Machine facilities:

	Machine No. I	**Machine No. II**
Budgeted	(40 × ₹4.50) = ₹180	(40 × ₹6.50) = ₹260
Actual number of hours	30	32½
Actual rate per hour	₹6	₹8
Supplementary rate per hour	₹6 – ₹4.50 = ₹1.50	₹8 – ₹6.50 = ₹1.50

42. (*i*) Calculation of Overhead Recovery Rates as per the Policy i.e., (Single Blanket rate)

Departments	**Budgeted Factory OHs (₹)**	**Budgeted Direct Wages (₹)**
Machining	3,60,000	80,000
Assembly	1,40,000	3,50,000
Packing	1,25,000	70,000
Total	**6,25,000**	**5,00,000**

Blanket OH Recovery Rate = $\frac{\text{Total Overheads (Budgeted)}}{\text{Total Direct Wages (Budgeted)}} \times 100 = \frac{6,25,000}{5,00,000} \times 100$ = 125 % of Direct wages

Selling Price of Job No. CW 7083:	₹
Direct Materials (1200 + 600 + 300)	2,100.00
Direct Wages (240 + 360 + 60)	660.00
Prime Cost	2,760.00
Add: Overheads @ 125% of Direct Wages i.e. 660 × 125%	825.00
Factory/Works Cost	3,585.00
Add: Administrative/Selling Overheads and Profits (3,585 × 30%)	1,075.50
Selling Price	4,660.50

(ii) Recommended Methods of absorption of factory overheads:

Single Blanket Overhead Recovery Rates could be used in places where work performed in each department is fairly uniform or standardized. But here in the given problem we can observe that among the three Departments, Machining Department is basically a machine intensive department whereas the Assembly & Packing Department are Labour Intensive Departments. Hence application of Single Blanket rate common to all the departments may not be suitable. Instead of applying Blanket Recovery Rates we may recommend different rates for different departments as under:

Machining Department:

Since, machine is the pre-dominant factor of production in this department, hence machine hour rate should be used to recover overheads:

Machine Hour Rate = $\frac{\text{Budgeted Factory Overhead}}{\text{Budgeted Machine Hour}} = \frac{3,60,000}{80,000}$ = 4.5 per machine hour

Assembly Department:

Direct Labour being the predominant factor of production in this department, hence Direct Labour Hour rate should be used to recover overheads in this department.

$$\text{Direct Labour Hour Rate} = \frac{\text{Budgeted Factory Overhead}}{\text{Budgeted Direct Labour Hour}} = \frac{1,40,000}{1,00,000\ \text{Hours}} = ₹1.4 \text{ per Direct Labour Hour}$$

Packing Department:

Again, here also labour being the most important factor of production Direct Labour Rate should be used to recover overheads in this department.

$$\text{Direct Labour Hour Rate} = \frac{\text{Budgeted Factory Overhead}}{\text{Budgeted Direct Labour Hour}} = \frac{1,25,000}{50,000\ \text{Hours}} = ₹2.5 \text{ per Direct Labour Hour}$$

(iii) Selling Price of Job No. CW 7083 on the basis of overhead recovery rates recommended in (ii) above.

		₹
Direct Material (1200 + 600 + 300)		2,100
Direct Wages (240 + 360 + 60)		660
Prime Cost		2,760
Add: Factory Overheads:		
Machining Dept (180 Machine Hour × 4.5 Per Machine Hour)	810	
Assembly Dept.(120 Direct Labour Hour × 1.40 per DL Hr)	168	
Packing Dept:(40 Direct Labour Hour × 2.5 per DL Hr)	100	1,078
Works Cost		3,838
Add: Administrative Selling Overheads & Profit (3838 × 30%)		1,151.40
Selling Price		4,989.40

(iv) Under/Over Recovery of Overheads:

(a) Under Current Policy (i.e., Blanket Recovery Rates)

S. No.	Particulars	Departments (₹)			Total (₹)
		Machining	Assembly	Pocking	
A.	Direct Wages (Actual) (₹)	96,000	2,70,000	90,000	
B.	Overheads Recovered as per Single Blanket Rate of 125% of Direct Wages [A × 125%]	1,20,000	3,37,500	1,12,500	5,70,000
C.	Actual Overheads Incurred (₹)	3,90,000	84,000	1,35,000	6,09,000
D.	(Under)/Over Recovery of Overheads [B – C]	(2,70,000)	2,53,500	(22,500)	(39,000)

(b) Under the Suggested Method:

S. No.	Particulars	Departments			Total
		Machining	Assembly	Pocking	
A.	OH Recovery Method	Machine Hour Rate	Direct Labour Hour Rate	Direct Labour Hour Rate	
B.	OH Recovery Rates (₹)	₹4.5 per Machine Hour	₹1.4 per Direct Labour Hour	₹2.5 per Labour Hour	
C.	Machine Hours Worked in Machining Dept. (Hours)	96,000	—	—	
D.	Labour Hrs Worked in Assembly & Packing Dept	—	90,000	60,000	
E.	OHs Recovered: (₹) Machining [C × B]	4,32,000	—	—	
	Assembly: [D × B]	—	1,26,000	—	7,08,000
	Packing: [D × B]	—	—	1,50,000	6,09,000
F.	Actual Overheads Incurred (₹)	3,90,000	84,000	1,35,000	99,000
G.	(Under)/Over Recovery of OHs (₹) [E – F]	42,000	42,000	15,000	

43. Under recover = Actual OHs – Recovered OHs = 5,20,000 – (17040 × 30) = ₹8,800

44. (i) (d) Budgeted Machine hour rate (Blanket rate)

$$=\frac{₹50,40,000}{6,000 \text{ hours}}=₹840 \text{ per hour}$$

(ii) (a) ₹25,20,000

(iii) (a)

	Amount (₹)	Amount (₹)
Total production overheads actually incurred during the period		34,08,000
Less: Amount paid to worker as per court order	4,50,000	
Expenses of previous year booked in the current year	1,00,000	
Wages paid for the strike period under an award	10,06,000	
Obsolete stores written off	36,000	10,06,000
		(3000)

Less: Production overheads absorbed as per machine hour rate (3,000 hours × ₹840)		25,20,000
Amount of over absorbed production overheads		1,18,000

Budgeted Machine hour rate (Blanket rate) calculated in part (i)

(iv) **(b) Accounting treatment of over absorbed production overheads:** As, 40% of the over absorbed overheads were due to defective production policies, this being abnormal, hence should be credited to Costing Profit and Loss Account.

Amount to be credited to Profit and Loss Account

= ₹1, 18,000 × 40% = ₹47,200.

Balance of over absorbed production overheads should be distributed over Works in progress, Finished goods and Cost of sales by applying supplementary rate*.

Amount to be distributed = ₹1,18,000 × 60% = ₹70,800

$$\text{Supplementary rate} = \frac{₹70,800}{1,50,000 \text{ units}} = \textbf{₹0.472 per unit}$$

(v) (c) Apportionment of over absorbed production overheads over WIP, Finished goods and Cost of sales:

	Equivalent completed units	**Amount (₹)**
Work-in-Progress (80,000 units × 50% × 0.472)	40,000	18,880
Finished goods (20,000 units × 0.472)	20,000	9,440
Cost of sales (90,000 units × 0.472)	90,000	42,480
Total	1,50,000	70,800

❑❑❑

CHAPTER 6

Activity Based Costing

Meaning of Activity Based Costing (ABC)	• According to CIMA London, "ABC Costing is the cost attribution to cost units on the basis of benefits received from indirect activities, e.g. ordering, setting up, assuring quality". • ABC assigns cost to activities based on their use of resources. • It then assigns cost to cost objects, such as products or customers, based on their use of activities.
Meaning of Activity	• It here refers to an event that incurs cost. • It comprises of units of work or tasks. Example, purchase of material is an activity consisting a series of tasks like purchase requisition, follow-up, etc.
Meaning of Cost Object	• Anything for which cost is ascertained is known as cost object. It may be a job, a product or a customer, etc. In the case of product, a cost object may be a car, a TV set, a computer etc.
Meaning of Cost Driver	• It is a factor that causes a change in the cost of an activity. • It shows why resources are consumed by an activity. • Cost drivers are of two types: ➢ Resource cost driver i.e. the measure of the quantity of resources consumed by an activity ➢ Activity cost driver i.e. the measure of the frequency and intensity of demand placed on the activities by cost object.
Meaning of Cost Pool	• It is grouping of individual cost items. A cost pool is created for each activity. Cost pool, also known as cost bucket, is like a cost center for which costs are accumulated.
Factors Prompting the Development of ABC	• Growing overhead costs • Increasing market competition requiring more accurate product cost • Increasing product diversity to secure economies of scope • Decreasing cost of information processing
Usefulness or Suitability of ABC	• High amount of overhead • Wide range of products • Presence of non-volume related activities • Stiff competition

<table>
<tr><td>Comparison of Traditional and ABC system</td><td>
<table>
<tr><th>Traditional Costing System</th><th>Activity Based Costing System</th></tr>
<tr><td>• Uses from one to three volume based cost drivers</td><td>• Uses activity based multiple cost drivers (including both volume and non-volume based)</td></tr>
<tr><td>• Assigns overhead costs first to departments and then to products or services</td><td>• Assigns overhead costs first to activities and then to products or services</td></tr>
<tr><td>• Focuses on management responsibility for costs within departments</td><td>• Focuses on processes and activities for cross functional problem solving.</td></tr>
</table>
</td></tr>
<tr><td>Unit Level Activities</td><td>• Unit level activities are the activities whose costs are strongly correlated to the number of units produced.
• E.g. use of indirect material tends to increase in proportion to the number of units produce.</td></tr>
<tr><td>Batch Level Activities</td><td>• Batch level activities are the activities whose costs are driven by the number of batches of units produced but is common or fixed for all units within the batch.
• E.g. machine set-up cost where machines need resetting between each different batch of production.</td></tr>
<tr><td>Production Level Activities</td><td>• In this case the cost of some of the activities are driven by the creation of a new product line and its maintenance.
• E.g. designing the product, technical drawings of products etc.</td></tr>
<tr><td>Facility Level Activities</td><td>• These are the activities which cannot be directly attributed to individual products.
• These are necessary to sustain the manufacturing process and are common and joint to all products manufactured
• E.g. maintenance of buildings, plant security etc.</td></tr>
<tr><td>Steps Involved in Activity Based Costing</td><td>• Step 1: Identify the various Activities within the organization
• Step 2: Relate the Overheads to the Activities using Resource Cost Drivers
• Step 3: Apportion the costs of Support Activities over the Primary Activities on suitable basis
• Step 4: Determine the Activity Cost Drivers for each Activity/Cost Pool
• Step 5: Calculate Activity Cost Driver Rate
$= \frac{\text{Total Cost of Activity}(\text{Cost Pool})}{\text{Activity Cost Driver}}$</td></tr>
</table>

Benefits of Activity Based Costing	• ABC provides more **accurate and informative product costs**, which lead to more accurate product profitability measurements and to better-informed strategic decisions. • ABC provides more **accurate measurements of activity-driving costs**, which helps managers improve product and process value. • ABC provides managers **easier access to relevant costs** for making business decisions, enabling them to take a more competitive position.
Limitations of Activity Based Costing	• **Allocations –** Even if activity data are available, some costs probably require allocations to departments and products based on arbitrary volume measures. • **Omission of costs –** ABC omits from the analysis some costs identified with specific products. Activities that cause such costs include marketing, advertising, research and development, product engineering, and warranty claims. • **Expense and time –** An ABC system is very expensive to develop and implement and is very time consuming.
Requirement in Implementation of Activity Based Costing	• **Staff Training –** It should be done to create an awareness of the purpose of ABC. • **Process Specification –** Informal, but structure, interviews with key members of personnel will identify the different stages of the production process, the commitment of resources to each, processing times and bottlenecks. • **Activity Definition –** Early activity should be clearly defined the problem must be kept manageable at this state, despite the possibility of information overload from new data, much of which is in need to codification. • **Activity Driver Selection -** Cost driver for each activity shall be selected. • **Assigning Cost –** A single representative activity driver can be used to assign costs from the activity pools to the cost objects.
Practical Applications of Activity Based Costing	• As a decision making tool • As activity based management • Facilitate activity based budgeting
Activity Based Management	• It refers to use of ABC as a costing tool to manage activity level costs. • It involves various analysis which are as follows: ➢ Cost driver analysis ➢ Activity analysis to identify value added activities and non-value added activities. ➢ Performance analysis • It can be used in following ways: ➢ Cost reduction ➢ Business process re-engineering ➢ Benchmarking ➢ Performance measurement

Activity Based Budgeting (ABB)	• ABB analyse the resource input or cost for each activity. • It provides a framework for estimating the amount of resources required in accordance with the budgeted level of activity. • Actual results can be compared with budgeted results to highlight both in financial and non-financial terms those activities with major discrepancies from budget for potential reduction in supply of resources. • The three elements of activity based budgeting are as follows: ➢ Type of work to be done ➢ Quantity of work to be done ➢ Cost of work to be done
Benefits of Activity Based Budgeting (ABB)	• ABB can enhance accuracy of financial forecasts and increasing management understanding • When automated, ABB can rapidly and accurately produce financial plans and models based on varying levels of volume assumptions • ABB eliminates much of the needless rework created by traditional budgeting techniques

PRACTICE QUESTIONS

1. A company manufacturing two products furnishes the following data for a year:

[Similar May 2018, Similar Nov 2022]

Product	Annual Output (Units)	Total Machine hours	Total number of purchase orders	Total number of set-ups
S	5,000	20,000	160	20
K	60,000	1,20,000	384	44

The annual overheads are as under:	₹
Volume related activity costs	5,50,000
Set up related costs	8,20.000
Purchase related costs	6,18,000

You are required to calculate the cost per unit of each product S and K based on:

(i) Traditional method of charging overheads,

(ii) Activity based costing method.

Ans. (i) ₹56.80; ₹28.40; (ii) ₹103.32; ₹24.53.

2. SK Ltd. is a multiproduct company, manufacturing three products S, K and M. the budgeted costs and production for the year ending March 31st, are as follows: **[SM]**

	S	K	M
Production quantity (units)	4,000	3,000	1,600
Resources per unit:			
Direct Material (Kg)	4	6	3
Direct labour (Minutes)	30	45	60

The budgeted direct labour rate was ₹10 per hour and the budgeted materials cost was ₹2 per Kg. Production overheads were budgeted at ₹99,450 and were absorbed to products using the direct labour hour rate. SK Ltd. followed an Absorption Costing System.

SK Ltd. is in consideration to adopt an Activity Based Costing System. The following additional information is made available for this purpose:

(a) Budgeted overheads were analyzed into the following:

Material handling	₹29,100
Storage costs	₹31,200
Electricity	₹39,150

(b) The cost drivers identified were as follows:

Material handling	Weight of material handled
Storage costs	Number of batches of material
Electricity	Number of machine operators

(c) Data on Cost Drivers was as follows:

	S	K	M
For complete production:			
Batches of material	10	5	15
Per unit of production:			
Number of machine operators	6	3	2

You are required to:

(a) Prepare a statement for management showing the unit costs and total costs of each product using the absorption costing method.

(b) Prepare a statement for management showing the products costs of each product using the ABC approach

(c) What are the reasons for the different product costs under the two approaches?

Ans. (a) ₹21.50; ₹32.25; ₹33; (b) ₹25.09; ₹28.97; ₹30.16.

3. SK Ltd. has collected the following data for its two activities. It calculates activity cost rates based on cost driver capacity: **[Similar MTP May 2024]**

Activity	Cost Driver	Capacity	Cost
Power	Kilowatt hours	50,000 kilowatt hours	₹2,00,000
Quality inspections	No. of inspections	10,000 inspections	₹3,00,000

The company makes three products S, K and M. For the year ended March 31, the following consumption of cost driver was reported:

Product	Kilowatt Hours	Quality Inspections
S	10,000	3,500
K	20,000	2,500
M	15,000	3,000

Required:

(i) Compute the costs allocated to each product from each activity

(ii) Calculate the cost of unused capacity for each activity

(iii) Discuss the factors the management considers in choosing a capacity level to compute the budgeted fixed overhead cost rate.

Ans. (i) Total Power = ₹1,80,000; Total Inspection = ₹2,70,000; (ii) ₹20,000; ₹30,000.

4. 'Humara – Apna' bank offers three products, viz. deposits, Loans and Credit Cards. The bank has selected 4 activities for a detailed budgeting exercise, following activity based costing method. **[SM]**

The bank wants to know the product wise total cost per unit for the selected activities, so that price may be fixed accordingly. The following information is made available to formulate the budget:

Activity	Present Cost (₹)	Estimation for the budget period
ATM Services:		
(a) Machine Maintenance	4,00,000	All fixed, no change
(b) Rents	2,00,000	Fully fixed, no change
(c) Currency replenishment cost	1,00,000	Expected to double during budget
	7,00,000	(This activity is driven by no. of ATM transactions)
Computer Processing	5,00,000	Half this amount is fixed and no change is expected. The variable portion is expected to increase to three times the current level. (This activity is driven by the number of computer transactions)
Issuing Statements	18,00,000	Presently, 3 lakh statements are made. In the budget period, 5 lakh statements are expected. For every, increase of one lakh statement, one lakh rupees is the budgeted increase. (This activity is driven by the number of statements)
Computer Inquiries	2,00,000	Estimated to increase by 80% during the budgeted period. (This activity is driven by telephone minutes)

The activity drivers and their budgeted quantities are given below:

Activity Drivers	Deposits	Loans	Credit Cards
No. of ATM transactions	1,50,000	-	50,000
No. of Computer Processing Transactions	15,00,000	2,00,000	3,00,000
No. of Statements to be issued	3,50,000	50,000	1,00,000
Telephone Minutes	3,60,000	1,80,000	1,80,000

The bank budgets a volume of 58,600 deposit accounts, 13,000 loan accounts and 14,000 credit card accounts.

Required:

(i) Calculate the budgeted rate for each activity

(ii) Prepare the budgeted cost statement activity wise.

(iii) Compute the budgeted product cost per account for each product using (i) and (ii) above.

Ans. (i) ₹4; ₹0.50; ₹4; ₹0.50; (ii) ₹58,600; ₹13,000; ₹14,000; (iii) ₹50; ₹30; ₹60.

5. SK is a global brand created by SK Ltd. The company manufactures three range of beauty soaps i.e. SK-Gold, SK-Pearl, and SK-Diamond. The budgeted costs and production for the month of March, 2021 are as follows: **[SM]**

	SK-Gold		SK-Pearl		SK-Diamond	
Production of soaps (Units)	**4,000**		**3,000**		**2,000**	
Resources per Unit:	**Qty**	**Rate**	**Qty**	**Rate**	**Qty**	**Rate**
- Essential Oils	60 ml	₹200/100 ml	55 ml	₹300/100 ml	65 ml	₹300/100 ml
- Cocoa Butter	20 g	₹200/100 g	20 g	₹200/100 g	20 g	₹200/100 g
- Filtered Water	30 ml	₹15/100 ml	30 ml	₹15/100 ml	30 ml	₹15/100 ml
- Chemicals	10 g	₹30/100 g	12 g	₹50/100 g	15 g	₹60/100 g
- Direct Labour	30 Min.	₹10/hour	40 Min.	₹10/hour	60 Min.	₹10/hour

SK Ltd. followed an Absorption Costing System and absorbed its production overheads, to its products using direct labour hour rate, which were budgeted at ₹1,98,000.

Now, SK Ltd. is considering adopting an Activity Based Costing system. For this, additional information regarding budgeted overheads and their cost drivers is provided below:

Particulars	(₹)	Cost drivers
Forklifting cost	58,000	Weight of material lifted
Supervising cost	60,000	Direct labour hours
Utilities	80,000	Number of Machine operations

The number of machine operations per unit of production are 5, 5, and 6 for SK-Gold, SK-Pearl, and SK-Diamond respectively.

(Consider (i) Mass of 1 litre of Essential Oils and Filtered Water equivalent to 0.8 kg and 1 kg respectively (ii) Mass of output produced is equivalent to the mass of input materials taken together.)

You are requested to:

(i) Prepare a statement showing the unit costs and total costs of each product using the absorption costing method.

(ii) Prepare a statement showing the product costs of each product using the ABC approach.

(iii) State what are the reasons for the different product costs under the two approaches?

Ans. (i) ₹189; ₹244.17; ₹291.50; (ii) ₹192.48; ₹243.70; ₹285.72.

6. The profit margin of BABY Hairclips Company were over 20% of sales producing BROWN and BLACK hairclips. **[RTP Nov 2022]**

During the last year, GREEN hairclips had been introduced at 10% premium in selling price after the introduction of YELLO hairclips earlier five years back at 10/3% premium. However, the manager of the company is disheartened with the sales figure for the current financial year as follows:

Traditional Income Statement (in ₹)

	Brown	Black	Yellow	Green	Total
Sales	1,50,00,000	1,20,00,00	27,90,000	3,30,000	3,01,20,000
Material costs	50,00,000	40,00,000	9,36,000	1,10,000	1,0046,000
Direct labour	20,00,000	16,00,000	3,60,000	40,000	40,00,000
Overheads (3 times of direct labour)	60,00,000	48,00,000	10,80,000	1,20,000	1,20,00,000
Total operating income	20,00,000	16,00,000	4,14,000	60,000	40,74,000
Return on sales (in %)	13.3%	13.3%	14.8%	18.2%	13.5%

It is a known fact that customer are ready to pay premium amount for YELLOW and GREEN hairclips for their attractiveness; and the percentage returns are also high in new products.

At present, all of the Plant's indirect expenses are allocated to the products at 3 times of the direct labour expenses. However, the manager is interested in allocating indirect expenses on the basis of activity cost to reveal real earner. He provides support expenses category-wise as follows:

Support Expenses	(₹)
Indirect labour	40,00,000
Labour Incentives	32,00,000
Computer Systems	20,00,000
Machinery depreciation	16,00,000
Machine maintenance	8,00,000
Energy for machinery	4,00,000
Total	1,20,00,000

He provides following additional information for accomplishment of his interest:

Incentive to be allocated @40% of labour expenses (both direct and indirect).

Indirect labour are involved mainly in three activities. About half of indirect labour is involved in handling production runs. Another 40% is required just for the physical changeover from one color hairclip to another because YELLO hairclips require substantial labour for preparing the machine as compared to other colour hairclips. Remaining 10% of the time is spent for maintaining records of the products in four parts.

Another amount spent on computer system of ₹20,00,000 is for maintenance of documents relating to production runs and record keeping of the four products. In aggregate, approx. 80% of the amount expend is involved in the production run activity and approx. 20% is used to keep records of the products in four parts.

Other overhead expenses i.e. machinery depreciation, machine maintenance and energy for machinery are incurred to supply machine capacity to produce all the hairclips (practical capability of 20,000 hours).

Activity Cost Drivers:

Particulars	Brown	Black	Yellow	Green	Total
Sales volume (units)	1,00,000	80,000	18,000	2,000	2,00,000
Selling price (₹)	150	150	155	165	
Material cost (₹)	50	50	52	55	
Machine hours per unit (Hrs)	0.10	0.10	0.10	0.10	20,000
Production runs	100	100	76	24	300
Setup time per run (Hrs)	4	1	6	4	

You are required to:

(i) Calculate operating income and operating income as per percentage of sales using activity-based costing system

(ii) State the reasons for different operating income under traditional income system and activity based costing system.

Ans. (i) 21.61%; 22,67%; -44%; -200.12%.

7. SK Limited has decided to analyse the profitability of its five new customers. It buys bottled water at ₹90 per case and sells to retail customers at a list price of ₹108 per case. The data pertaining to five customers are: **[SM, Similar Nov 2019]**

	Customers				
	S	K	M	P	J
Cases sold	4,680	19,688	1,36,800	71,550	8,775
List selling price	₹108	₹108	₹108	₹108	₹108
Actual selling price	₹108	₹106.20	₹99	₹104.40	₹97.20
Number of purchase order	15	25	30	25	30
Number of Customer visits	2	3	6	2	3

	Customers				
	S	K	M	P	J
Number of deliveries	10	30	60	40	20
Kilometers travelled per delivery	20	6	5	10	30
Number of expedited deliveries	0	0	0	0	1

Its five activities and their cost drivers are:

Activity	Cost Driver Rate
Order taking	₹750 per purchase order
Customer visits	₹600 per customer visit
Deliveries	₹5.75 per delivery km travelled
Product handling	₹3.75 per case sold
Expedited deliveries	₹2,250 per expedited delivery

Required:

(a) Compute the customer level operating income of each of five retail customers now being examined (S, K, M, P and J). Comment on the results.

(b) What insights are gained by reporting both the list selling price and the actual selling price for each customer.

Ans. (a) ₹53,090; ₹2,23,531; ₹6,90,375; ₹7,39,757; 274.

PRACTICE QUESTIONS

8. SK Ltd. manufactures three types of products namely P,Q and R. The data relating to a period are as under: **[SM, Similar May 2022]**

Particulars	S	K	M
Machine hours per unit	10	18	14
Direct Labour hours per unit	4	12	8
Direct Material per unit (₹)	90	80	120
Production (units)	3,000	5,000	20,000

Currently the company uses traditional costing method and absorbs all production overheads on the basis of machine hours. The machine hour rate of overhead is ₹6 per hour. Direct labour hour rate is ₹20 per hour.

The company proposes to use activity based costing system and the activity analysis is as under:

Particulars	S	K	M
Batch size (units)	150	500	1,000
Number of purchase orders per batch	3	10	8
Number of inspections per batch	5	4	3

The total production overheads are analysed as under:

Machine set up costs	20%
Machine operations costs	30%
Inspection costs	40%
Material procurement related costs	10%

Required:

(i) Calculate the cost per unit of each product using traditional method of absorbing all production overheads on the basis of machine hours.

(ii) Calculate the cost per unit of each using activity based costing principles.

Ans. (i) ₹230; ₹428; ₹364; (ii) ₹427; ₹425; ₹335.20.

9. PQR Ltd. is engaged in the production of three products P, Q and R. The company calculates Activity Cost Rates on the basis of Cost Driver capacity which is provided as below: **[July 2021]**

Activity	Cost Driver	Cost Driver Capacity	Cost (₹)
Direct Labour Hours	Labour Hours	30,000 Labour Hours	3,00,000
Production runs	No. of Production runs	600 Production runs	1,80,000
Quality Inspections	No. of Inspections	8000 Inspections	2,40,000

The consumption of activities during the period is as under:

Activity/Products	P	Q	R
Direct Labour hours	10,000	8,000	6,000
Production runs	200	180	160
Quality Inspection	3,000	2,500	1,500

You are required to:

(i) Compute the cost allocated to each Product from each Activity.

(ii) Calculate the cost of unused capacity for each activity

(iii) A potential customer has approached the company for supply of 12,000 units of net product 'S' to be delivered in lots of 1,500 units per quarter. This will involve an initial design cost of ₹30,000 and per quarter production will involve the following:

Direct Material	₹18,000
Direct Labour hours	1,500 hours
No. of Production runs	15
No. of Quality Inspection	250

Prepare cost sheet segregating direct and indirect cost and compute the sales value per quarter of product 'S' using ABC system considering a markup of 20% on cost.

Ans. (i) ₹2,50,000; ₹2,09,000; ₹1,53,000; (ii) ₹60,000; ₹18,000; ₹30,000; (iii) ₹58,500.

10. ABC Ltd. manufactures three products X, Y and Z using the same plant and resources. It has given the following information for the year ended on 31st March, 2020: **[Jan 2021]**

	X	Y	Z
Production Quantity (units)	1200	1440	1968
Cost per unit:			
Direct Material (₹)	90	84	176
Direct Labour (₹)	18	20	30

Budgeted direct labour rate was ₹4 per hour and the production overheads, shown in table below, were absorbed to products using direct labour hour rate. Company followed Absorption Costing Method. However, the company is now considering adopting Activity Based Costing Method.

	Budgeted Overheads (₹)	Cost Driver	Remarks
Material Procurement	50,000	No. of orders	No. of orders was 25 for each product
Set-up	40,000	No. of Production Runs	All the three products are produced in production runs of 48 units.
Quality Control	28,240	No. of Inspections	Done for each production run.
Maintenance	1,28,000	Maintenance Hours	Total maintenance hours were 6,400 and was allocated in the ratio of 1:1:2 between X, Y and Z.

Required:

(i) Calculate the total cost per unit of each product using the Absorption Costing Method.

(ii) Calculate the total cost per unit of each product using the Activity Based Costing.

Ans. (i) ₹148.50; ₹149; ₹273.50; (ii) ₹163.37; ₹152.60; ₹261.80.

11. SK Ltd. Manufactures two types of machinery equipment S and K and applies/absorbs overheads on the basis of direct-labour hours. The budgeted overheads and direct labour hours for the month of December, are ₹12,42,500 and 20,000 hours respectively. The information about Company's products are as follows: **[SM]**

	Equipment S	Equipment K
Budgeted Production volume	2,500 units	3,125 units
Direct material cost	₹300 per unit	₹450 per unit
Direct labour cost		
S: 3 hours @ ₹150 per hour	₹450	
K: 4 hours @ ₹150 per hour		₹600

SK Ltd.'s overheads of ₹12,42,500 can be identified with three major activities:

Order processing (₹2,10,000), machine processing (₹8,75,000) and product inspection (₹1,57,500). These activities are driven by number of orders processed, machine hours worked and inspection hours, respectively. The data relevant to these activities is as follows:

	Order processed	Machine hours worked	Inspection hours
S	350	23,000	4,000
K	250	27,000	11,000
Total	600	50,000	15,000

Required:

(a) Assuming use of direct-labour hours to absorb/apply overheads to production, compute the unit manufacturing cost of the equipment S and K, if the budgeted manufacturing volume is attained.

(b) Assuming use of activity-based costing, compute the unit manufacturing costs of the equipment S and K, if the budgeted manufacturing volume is achieved.

(c) SK Ltd.'s selling prices are based heavily on cost. By using direct-labour hours as an application based, calculate the amount of cost distortion (under-costed or over-costed) for each equipment.

Ans. (a) ₹936.38; ₹1,298.50; (b) ₹976.80; ₹1,266.16; (c) -₹40.42; +₹32.34.

12. SK Pvt. Ltd. manufactures three products using three different machines. At present the overheads are charged to products using labour hours. The following statement for the month of March 2021, using the absorption costing method is been prepared: **[RTP Nov 2019]**

Particulars	Product S (using Machine A)	Product K (using Machine B)	Product P (using Machine C)
Production units	45,000	52,500	30,000
Material cost per unit (₹)	350	460	410
Wages per unit @ ₹80 per hour	240	400	560
Overhead cost per unit (₹)	240	400	560
Total cost per unit (₹)	830	1,260	1,530
Selling price (₹)	1,037.50	1,575	1,912.50

The following additional information is available relating to overhead cost drivers:

Cost driver	Product S	Product K	Product P	Total
No. of machine set-ups	40	160	400	600
No. of purchase orders	400	800	1,200	2,400
No. of customers	1,000	2,200	4,800	8,000

Actual production and budgeted production for the month is same. Workers are paid at standard rate. Out of total overhead costs, 30% related to machine set-ups, 30% related to customer order processing and customer complaint management.

Required:

(a) Compute overhead cost per unit using activity based costing method

(b) Determine the selling price of each product based on activity based costing with the same profit mark-up on cost.

Ans. (a) ₹129.60; ₹268.40; ₹955.80; (b) ₹899.50; ₹1,410.57; ₹2,407.25.

13. SK Ltd. is a manufacturer of a range of goods. The cost structure of its different products is as follows: **[RTP May 2018]**

Particulars	Product S	Product K	Product M	
Direct Materials	50	40	40	₹/u
Direct Labour @ ₹10/hour	30	40	50	₹/u
Production Overheads	30	40	50	₹/u
Total Cost	110	120	140	₹/u
Quantity Produced	10,000	20,000	30,000	Units

SK Ltd. was absorbing overheads on the basis of direct labour hours. A newly appointed management accountant has suggested that the company should introduce ABC system and has identified cost drivers and cost pools as follows:

Activity Cost Pool	Cost Driver	Associated Cost (₹)
Stores Received	Purchase Requisitions	2,96,000
Inspection	Number of Production Runs	8,94,000
Dispatch	Orders Executed	2,10,000
Machine Setup	Number of Setups	12,00,000

The following information is also supplied:

Details	Product S	Product K	Product M
No. of Setups	360	390	450
No. of Orders Executed	180	270	300
No. of Production Runs	750	1,050	1,200
No. of Purchase Requisitions	300	450	500

Required to calculate activity based production cost of all the three products.

Ans. ₹150.49; ₹124.25; ₹123.67.

14. SK Limited manufactures three products S, K and M which are similar in nature and are usually produced in production runs of 100 units. Product S and M require both machine hours and assembly hours, whereas product K requires only machine hours. The overheads incurred by the company during the first quarter are as under: **[MTP May 2019]**

Machine Department expenses	₹18,48,000
Assembly Department expenses	₹6,72,000
Setup costs	₹90,000
Stores receiving cost	₹1,20,000
Order processing and dispatch	₹1,80,000
Inspect and Quality control cost	₹36,000

The data related to the three products during the period are as under:

	S	K	M
Units produced and sold	15,000	12,000	18,000
Machine hours worked	30,000 hrs.	48,000 hrs.	54,000 hrs.
Assembly hours worked (direct labour hours)	15,000 hrs.	-	27,000 hrs.
Customers' orders executed (in numbers)	1,250	1,000	1,500
Number of requisitions raised on the stores	40	30	50

Required:

Prepare a statement showing details of overhead costs allocated to each product type using activity based costing.

Ans. ₹8,02,000; ₹7,83,600; ₹13,60,400.

15. Bank of SK operated for years under the assumption that profitability can be increase by increasing Rupee volume. But that has not been the case. Cost analysis has revealed the following:

[MTP May 2018]

Activity	Activity Cost (₹)	Activity Driver	Activity Capacity
Providing ATM Service	1,00,000	No. of Transactions	2,00,000
Computer Processing	10,00,000	No. of Transactions	25,00,000
Issuing Statements	8,00,000	No. of Statements	5,00,000
Customer Inquiries	3,60,000	Telephone Minutes	6,00,000

The following annual information on three products was also made available:

Activity Driver	Checking Accounts	Personal Loans	Gold Visa
Units of Product	30,000	5,000	10,000
ATM Transactions	1,80,000	0	20,000
Computer Transactions	20,00,000	2,00,000	3,00,000
Number of Statements	3,00,000	50,000	1,50,000
Telephone Minutes	3,50,000	90,000	1,60,000

Required:

(a) Calculate rates for each activity

(b) Using the rates computed in required (a), calculate the cost of each product.

Ans. (a) ₹0.50; ₹0.40; ₹1.60; ₹0.60; (b) ₹52.67; ₹42.80; ₹46.60.

16. MNO Ltd. manufactures two types of equipment A and B and absorbs overheads on the basis of direct labour hours. The budgeted overheads and direct labour hours for the month of March 2019 are ₹15,00,000 and 25,000 hours respectively. The information about the company's products is as follows: **[May 2019]**

	Equipment	
	A	**B**
Budgeted Production Volume	3,200 units	3,850 units
Direct Material Cost	₹350 per unit	₹400 per unit
Direct Labour Cost		
A: 3 hours @ ₹120 per hour	₹360	
B: 4 hours @ ₹120 per hour		₹480

Overheads of ₹15,00,000 can be identified with the following three major activities:

Order Processing	₹3,00,000
Machine Processing	₹10,00,000
Product Inspection	₹2,00,000

These activities are driven by the number of orders processed, machine hours worked and inspection hours respectively. The data relevant to these activities is as follows:

	Orders Processed	Machine hours worked	Inspection hours
A	400	22,500	5,000
B	200	27,500	15,000
Total	**600**	**50,000**	**20,000**

Required:

(i) Prepare a statement showing the manufacturing cost per unit of each product using the absorption costing method assuming the budgeted manufacturing volume is attained.

(ii) Determine cost driver rates and prepare a statement showing the manufacturing cost per unit of each product using activity based costing, assuming the budgeted manufacturing volume is attained.

(iii) MNO Ltd.'s selling prices are based heavily on cost. By using direct labour hours as an application base, calculate the amount of cost distortion (under costed or over costed) for each equipment.

Ans. (i) ₹890; ₹1,120; (ii) ₹928.75; ₹1,087.79; (iii) -₹38.75; + ₹32.21.

17. The following budgeted information relates to N Ltd. for the year 2021: **[RTP May 2021]**

	Products		
	X	Y	Z
Production and Sales (Units)	1,00,000	80,000	60,000
	(₹)	(₹)	(₹)
Selling price per unit	90	180	140
Direct cost per unit	50	90	95
	Hours	Hours	Hours
Machine department (machine hours per unit)	3	4	5
Assembly department (direct labour hours per unit)	6	4	3

The estimated overhead expenses for the year 2021 will be as below:

Machine Department ₹73,60,000

Assembly Department ₹55,00,000

Overhead expenses are apportioned to the products on the following basis:

Machine Department On the basis of machine hours

Assembly Department On the basis of labour hours

After a detailed study of the activities the following cost pools and their respective cost drivers are found:

Cost Pool	Amount (₹)	Cost Driver	Quantity
Machining services	64,40,000	Machine hours	9,20,000 hours
Assembly services	44,00,000	Direct labour hours	11,00,000 hours
Set-up costs	9,00,000	Machine set-ups	9,000 set-ups
Order processing	7,20,000	Customer orders	7,200 orders
Purchasing	4,00,000	Purchase orders	800 orders

As per an estimate the activities will be used by the three products:

	Products		
	X	Y	Z
Machine set-ups	4,500	3,000	1,500
Customer orders	2,200	2,400	2,600
Purchase orders	300	350	150

You are required to prepare a product-wise profit statement using:

(a) Absorption costing method;

(b) Activity-based method.

Ans. (a) (₹14,00,000); ₹30,40,000; (₹6,00,000); (b) (₹13,20,000); ₹29,65,000; (₹6,05,000).

18. RST Limited specializes in the distribution of pharmaceutical products. It buys from the pharmaceutical companies and resells to each of the three different markets. **[SM]**

(a) General Supermarket Chains

(b) Drugstore Chains

(c) Chemist Shops

The following data for the month of April, 2004 in respect of RST Limited has been reported:

	General Super Market Chains (₹)	Drugstore Chains (₹)	Chemist Shops (₹)
Average revenue per delivery	84,975	28,875	5,445
Average cost of goods sold per delivery	82,500	27,500	4,950
Number of deliveries	330	825	2,750

In the past, RST Limited has used gross margin percentage to evaluate the relative profitability of its distribution channels. The company plans to use activity-based costing for analyzing the profitability of its distribution channels.

The activity analysis of RST Limited is as under:

Activity Area	Cost Driver
Customer purchase order processing	Purchase orders by customers
Line-item ordering	Line-items per purchase order
Store delivery	Store deliveries
Cartons dispatched to stores	Cartons dispatched to a store per delivery
Shelf-stocking at customer store	Hours of shelf-stocking

The April, 2004 operating costs (other than cost of goods sold) of RST Limited are ₹8,27,970. These operating costs are assigned to five activity areas. The cost in each area and the quantity of the cost allocation basis used in that area for April, 2004 are as follows:

Activity Area	Total costs in April 2004 (₹)	Total Unit of costs allocation base used in April 2004
Customer purchase order processing	2,20,000	5,500 orders
Line-item ordering	1,75,560	58,520 line items
Store delivery	1,95,250	3,905 store deliveries
Cartons dispatched to store	2,09,000	2,09,000 cartons
Shelf-stocking at customer store	28,160	1,760 hours

Other data for April, 2004 include the following:

	General Super Market Chains	Drugstore Chains	Chemist Shops
Total number of orders	385	990	4,125
Average number of line items per order	14	12	10
Total number of store deliveries	330	825	2,750
Average number of cartons shipped per store delivery	300	80	16
Average number of hours of shelf-stocking per store delivery	3	0.6	0.1

Required:

(a) Compute for April, 2004 gross-margin percentage for each of its three distribution channels and compute RST Limited's operating income.

(b) Compute the April, 2004 rate per unit of the cost-allocation base for each of the five activity areas.

(c) Compute the operating income of each distribution market in April, 2004 using the activity-based costing information. Comment on the results. What new insights are available with the activity-based cost information?

Ans. (a) 2.91%; 4.76%; 9.09%; (b) ₹40; ₹3; ₹50; ₹1; ₹16; (c) ₹6,53,840; ₹9,43,965; ₹8,86,600.

19. A drug store is presently selling three types of drugs namely 'Drug A', 'Drug B' and 'Drug C'. due to some constraints, it has decided to go for only one product line of drugs. It has provided the following data for the year 2020-21 for each product line: **[SM, Dec 2021]**

	Drug Types		
	A	B	C
Revenue (in ₹)	74,50,000	1,11,75,000	1,86,25,000
Cost of goods sold (in ₹)	41,44,500	68,16,750	1,20,63,750
Number of purchase orders placed (in nos)	560	810	630
Number of deliveries received	950	1,000	850
Hours of shelf-stocking time	900	1,250	2,350
Units sold (in nos)	1,75,200	1,50,300	1,44,500

Following additional information is also provided:

Activity	Description of Activity	Total Cost (₹)	Cost-allocation base
Drug License fee	Drug License fee	5,00,000	To be distributed in ratio 2:3:5 between A, B and C
Ordering	Placing of orders for purchases	8,30,000	2,000 purchase orders

Activity	Description of Activity	Total Cost (₹)	Cost-allocation base
Delivery	Physical delivery and receipt of goods	18,20,000	2,800 deliveries
Shelf stocking	Stocking of goods	32,40,000	4,500 hours of shelf-stocking time
Customer Support	Assistance provided to customers	28,20,000	4,70,000 units sold

You are required to:

(i) Calculate the operating income and operating income as a percentage (%) of revenue of each product line if:

(*a*) All the support costs (other than cost of goods sold) are allocated in the ratio of cost of goods sold

(*b*) All the support costs (Other than cost of goods sold) are allocated using activity-based costing system.

(ii) Give your opinion about choosing the product line on the basis of operating income as a percentage (%) of revenue of each product line under both the situation as above.

Ans. (i) (a) 22.12%; 14.60%; 9.32%; (b) 8.81%; 12.71%; 15.78%.

SOLUTION OF PRACTICE QUESTIONS

8.

(i) Statement showing cost per unit – Traditional Method

Particulars	P	Q	R
Direct material	90	80	120
Direct labour [(4, 12, 8 hours) × ₹20]	80	240	160
Production overheads [(10, 18, 14 hours) × ₹6]	60	108	84
Cost per unit	230	428	364

(ii) Total machine hours = (3,000 × 10) + (5,000 × 18) + (20,000 × 14) = 4,00,000

Total production overheads = 4,00,000 × ₹6 = ₹24,00,000

	Particulars	P	Q	R	Total
A.	Production (units)	3,000	5,000	20,000	
B.	Batch size (units)	150	500	1,000	
C.	Number of batches (A ÷ B)	20	10	20	50
D.	Number of purchase order per batch	3	10	8	
E.	Total purchase order (C × D)	60	100	160	320
F.	Number of inspections per batch	5	4	3	
G.	Total inspections (C × F)	100	40	60	200

Statement of cost driver rate

Activity	Overhead (₹)	Cost driver quantity	Cost driver rate (₹)
Setup	24,00,000 × 20% = 4,80,000	50 batches	9,600 per batch
Inspection	24,00,000 × 40% = 9,60,000	200 inspections	4,800 per inspection
Purchases	24,00,000 × 10% = 2,40,000	320 purchases	750 per purchase
Machine operations	24,00,000 × 30% = 7,20,000	4,00,000 machine hours	1.80 per machine hour

Statement showing cost per unit – Activity Based Costing Method

Particulars	P	Q	R
Production units	3,000	5,000	20,000
	(₹)	(₹)	(₹)
Direct material (90, 80, 120)	2,70,000	4,00,000	24,00,000
Direct labour (80, 240, 160)	2,40,000	12,00,000	32,00,000
Machine related costs [(30,000, 90,000, 2,80,000) × ₹1.80]	54,000	1,62,000	5,04,000
Setup costs [(20, 10, 20) × ₹9,600]	1,92,000	96,000	1,92,000
Inspection cost [(100, 40, 60) × ₹4,800]	4,80,000	1,92,000	2,88,000
Purchase related costs [(60, 100, 160) × ₹750]	45,000	75,000	1,20,000
Total Costs	12,81,000	21,25,000	67,04,000
Cost per unit (Total cost ÷ Units)	427	425	335.20

9.

(i) Statement of Cost Driver Rate

Activity	Amount (A)	Cost driver (B)	Cost Driver Rate (A÷B)
Direct Labour Hours	3,00,000	30,000 Labour Hours	₹10 per labour hour
Production runs	1,80,000	600 Production runs	₹300 per production run
Quality Inspections	2,40,000	8000 Inspections	₹30 per inspection

Statement of Cost

Particulars	P	Q	R	Total
Direct labour hour	10 × 10,000 = 1,00,000	10 × 8,000 = 80,000	10 × 6,000 = 60,000	2,40,000
Production run	300 × 200 = 60,000	300 × 180 = 54,000	300 × 160 = 48,000	1,62,000

Particulars	P	Q	R	Total
Quality inspection	30 × 3,000 = 90,000	30 × 2,500 = 75,000	30 × 1,500 = 45,000	2,10,000
Total Cost	**2,50,000**	**2,09,000**	**1,53,000**	**6,12,000**

(ii) Statement of Cost of Unused Capacity

Activity	Total Cost	Cost Charged to Products	Unused Cost
Direct Labour Hours	3,00,000	2,40,000	60,000
Production runs	1,80,000	1,62,000	18,000
Quality Inspections	2,40,000	2,10,000	30,000

(iii) Statement of Cost

Particulars	Amount (₹)
Direct material	18,000
Direct expenses (design cost) $\left(\frac{30,000}{12,000}\times 1,500\right)$	3,750
Prime Cost	21,750
Add: Overheads	
Direct labour hours (1,500 × 10)	15,000
Production run (15 × 300)	4,500
Quality inspection (250 × 30)	7,500
COS	48,750
Add: Profit (48,750 × 20%)	9,750
Sales	58,500

10.

Working Note:

(1) Total labour hours and recovery rate

Particulars	Product X	Product Y	Product Z	Total
Production units	1,200	1,440	1,968	
Labour hours per unit	18÷4 = 4.50	20÷4 = 5	30÷4 = 7.50	
Total labour hours	5,400	7,200	14,760	27,360
Total Overheads	-	-	-	2,46,240
OHs recovery rate	-	-	-	₹9

(2) Cost per activity and driver

Activity (1)	Total cost ₹ (2)	Cost allocation base (3)	Cost driver rate (4)=[(2)÷(3)]
Material Procurement	50,000	25 × 3 = 75 orders	₹666.67 per order
Set-up	40,000	$\frac{1200}{48}+\frac{1440}{48}+\frac{1968}{48}$ = 96 run	₹416.67 per run
Quality Control	28,240	$\frac{1200}{48}+\frac{1440}{48}+\frac{1968}{48}$ = 96 run	₹294.17 per run
Maintenance	1,28,000	6,400 hours	₹20 per hour

(i) Statement of Cost per unit

Particulars	X	Y	Z
Direct material	90	84	176
Direct labour	18	20	30
Overheads	9×4.50 = 40.50	9×5 = 45	9×7.50 = 67.50
	148.50	149	273.50

(ii) Statement of Cost per unit

Particulars	X	Y	Z
Direct material	90	84	176
Direct labour	18	20	30
Material procurement	$\frac{25\times666.67}{1,200}$ = 13.89	$\frac{25\times666.67}{1,440}$ = 11.57	$\frac{25\times666.67}{1,968}$ = 8.47
Set-up cost	$\frac{1,200\times416.67}{48\times1,200}$ = 8.68	$\frac{1,440\times416.67}{48\times1,440}$ = 8.68	$\frac{1,968\times416.67}{48\times1,968}$ = 8.68
Quality control cost	$\frac{1,200\times294.17}{48\times1,200}$ = 6.13	$\frac{1,440\times294.17}{48\times1,440}$ = 6.13	$\frac{1,968\times294.17}{48\times1,968}$ = 6.13
Maintenance	$\frac{20\times6400\times\left(\frac{1}{4}\right)}{1,200}$ = 26.67	$\frac{20\times6400\times\left(\frac{1}{4}\right)}{1,440}$ = 22.22	$\frac{20\times6400\times\left(\frac{2}{4}\right)}{1,968}$ = 32.52
Total Cost per unit	163.37	152.60	261.80

11.

(a) Overhead application base: Direct Labour Hours

	Equipment S (₹)	Equipment K (₹)
Direct material cost	300	450
Direct labour cost	450	600
Overheads (62.125×3) (62.125×4)	186.38	248.50
	936.38	1,298.50

$$\text{Pre-determined overhead rate} = \frac{\text{Budgeted Overheads}}{\text{Budgeted direct labour hours}} = \frac{12,42,500}{20,000} = ₹62.125$$

(b) Estimation of cost-driver rate

Activity	Overhead Cost (₹)	Cost-driver level	Cost driver rate (₹)
Order processing	2,10,000	600 order processed	350
Machine processing	8,75,000	50,000 machine hours	17.50
Inspection	1,57,500	15,000 inspection hours	10.50

Calculation of Overhead Costs

Activity	Equipment S (₹)	Equipment K (₹)
Order Processing (350×350) (250×350)	1,22,500	87,500
Machine processing (23,000×17.50) (27000×17.50)	4,02,500	4,72,500
Inspection (4000×10.50) (11,000×10.50)	42,000	1,15,500
Total overhead cost	5,67,000	6,75,500
Total units	2,500	3,125
Overhead per unit	226.80	216.16

Calculation of cost per unit

	Equipment S (₹)	Equipment K (₹)
Direct material cost	300	450
Direct labour cost	450	600
Overheads	226.80	216.16
	976.80	1,266.16

(c) Statement of cost

	Equipment S (₹)	Equipment K (₹)
Unit manufacturing cost-using direct labour hours as an application base	936.38	1,298.50
Unit manufacturing cost-using activity based costing	976.80	1,266.16
Cost distortion	(-) 40.42	+ 32.34

Low volume product S is under-costed and high volume product K is over costed using direct labour hours for overhead production.

12.

Working Note:

(1) Total labour hours and overhead cost:

Particulars	Product S	Product K	Product P	Total
Production units	45,000	52,500	30,000	1,27,500
Hour per unit	3	5	7	
Total hours	1,35,000	2,62,500	2,10,000	6,07,500
Rate per hour	-	-	-	₹80
Total Overheads	-	-	-	₹4,86,00,000

(2) Cost per activity and driver

Activity	Machine Set-up	Customer order processing	Customer complaint management	Total
Total overheads (₹)	1,45,80,000	1,45,80,000	1,94,40,000	4,86,00,000
No. of drivers	600	2,400	8,000	
Cost per driver (₹)	24,300	6,075	2,430	

(*a*) Computation of Overhead cost per unit:

Particulars	Product S	Product K	Product P
No. of machine set-up	40	160	400
Cost per driver (₹)	24,300	24,300	24,300
Total machine set-up cost (₹) (A)	**9,72,000**	**38,88,000**	**97,20,000**
No. of purchase orders	400	800	1,200
Cost per driver (₹)	6,075	6,075	6,075
Total order processing cost (₹) (B)	**24,30,000**	**48,60,000**	**72,90,000**
No. of customers	1,000	2,200	4,800
Cost per driver (₹)	2,430	2,430	2,430

Particulars	Product S	Product K	Product P
Total customer complaint management cost (₹) (C)	**24,30,000**	**53,46,000**	**1,16,64,000**
Total Overhead Cost (A + B + C)	58,32,000	1,40,94,000	2,86,74,000
Production units	45,000	52,500	30,000
Cost per unit (₹)	**129.60**	**268.40**	**955.80**

(*b*) Determination of selling price per unit

Particulars	Product S (using machine A)	Product K (using machine B)	Product P (using machine C)
Material cost per unit (₹)	350.00	460.00	410.00
Wages per unit @ ₹80 per hour	240.00	400.00	560.00
Overhead cost per unit (₹)	129.60	268.46	955.80
Total cost per unit (₹)	719.60	1,128.46	1,925.80
Profit (25% profit mark-up) (₹)	179.90	282.11	481.45
Selling price (₹)	**899.50**	**1,410.57**	**2,407.25**

13. The total production overheads are ₹26,00,000:

Product S: 10,000 × ₹30 = ₹3,00,000

Product K: 20,000 × ₹30 = ₹8,00,000

Product M: 30,000 × ₹30 = ₹15,00,000

On the basis of ABC analysis this amount will be apportioned as follows:

Particulars	Basis	Product S	Product K	Product M
Stores Receiving	Purchase Requisition 6:9:10	71,040	1,06,560	1,18,400
Inspection	Production Runs 5:7:8	2,23,500	3,12,900	3,57,600
Dispatch	Orders Executed 6:9:10	50,400	75,600	84,000
Machine Set-ups	Setups 12:13:15	3,60,000	3,90,000	4,50,000
Total Activity Cost		7,04,940	8,85,060	10,10,000
Quantity Produced		10,000	20,000	30,000
Units Cost (Overheads)		70.49	44.25	33.67
Add: Conversion cost (Material + Labour)		80	80	80
Total		150.49	124.25	123.67

14.

Calculation of Activity Rate

Cost pool	Costs (₹) (A)	Cost Driver (B)	Cost Driver Rate (₹) (A ÷ B)
Machine department expenses	18,48,000	Machine hours – 1,32,000 hours	14.00
Assembly department expenses	6,72,000	Assembly hours – 42,000 hours	16.00
Setup cost	90,000	No. of production runs – 450	200.00
Stores receiving cost	1,20,000	No. of requisitions raised on the stores – 120	1,000.00
Order processing and dispatch	1,80,000	No. of customers' orders executed – 3,750	48.00
Inspection and quality control cost	36,000	No. of production runs – 450	80.00
Total (₹)	29,46,000		

Number of production runs is 450 (150 + 120 + 180)

Statement showing Overheads Allocation

Particulars	S	K	M
Machine department expenses	4,20,000 (30,000 × 14)	6,72,000 (48,000 × 14)	7,56,000 (54,000 × 14)
Assembly department expenses	2,40,000 (15,000 × 16)	-	4,32,000 (27,000 × 16)
Setup cost	30,000 (150 × 200)	24,000 (120 × 200)	36,000 (180 × 200)
Stores receiving cost	40,000 (40 × 1,000)	30,000 (30 × 1,000)	50,000 (50 × 1,000)
Order processing and dispatch	60,000 (1,250 × 48)	48,000 (1,000 × 48)	72,000 (1,500 × 48)
Inspection and quality control cost	12,000 (150 × 80)	9,600 (120 × 80)	14,400 (180 × 80)
Overheads (₹)	8,02,000	7,83,600	13,60,400

15.

(a) Statement showing Activity Rate

Activity	Activity Cost (₹)	Activity Driver	Activity Capacity	Activity Rate
Providing ATM Service	1,00,000	No. of Transactions	2,00,000	0.50
Computer Processing	10,00,000	No. of Transactions	25,00,000	0.40
Issuing Statements	8,00,000	No. of Statements	5,00,000	1.60
Customer Inquiries	3,60,000	Telephone Minutes	6,00,000	0.60

(b) Statement showing Cost of Product

Activity	Checking Accounts (₹)	Personal Loan (₹)	Gold Visa (₹)
Providing ATM Service	1,80,000 × 0.50 = 90,000	-	20,000 × 0.50 = 10,000
Computer Processing	20,00,000 × 0.40 = 8,00,000	2,00,000 × 0.40 = 80,000	1,50,000 × 1.60 = 2,40,000
Issuing Statements	3,00,00 × 1.60 = 4,80,000	50,000 × 1.60 = 80,000	1,50,000 × 1.60 = 2,40,000
Customer Inquiries	3,50,000 × 0.60 = 2,10,000	90,000 × 0.60 = 54,000	1,60,000 × 0.60 = 96,000
Total Cost	15,80,000	2,14,000	4,66,000
Number of units	30,000	5,000	10,000
Cost per unit	52.67	42.80	46.60

16.

(i) Overhead application base: Direct Labour Hours

	Equipment A (₹)	Equipment B (₹)
Direct material cost	350	400
Direct labour cost	360	480
Overheads (60×3)(60×4)	180	240
	890	1,120

$$\text{Pre-determined overhead rate} = \frac{\text{Budgeted Overheads}}{\text{Budgeted direct labour hours}} = \frac{15,00,000}{25,000} = ₹60$$

(ii) Estimation of cost-driver rate

Activity	Overhead Cost (₹)	Cost-driver level	Cost driver rate (₹)
Order processing	3,00,000	600 order processed	500
Machine processing	10,00,000	50,000 machine hrs.	20
Inspection	2,00,000	15,000 inspection hrs.	10

Calculation of Overhead Costs

Activity	Equipment A (₹)	Equipment B (₹)
Order Processing (400×500) (200×500)	2,00,000	1,00,000
Machine processing (22,500×20) (27,500×20)	4,50,000	5,50,000
Inspection (5000×10) (10,000×10)	50,000	1,50,000
Total overhead cost	7,00,000	8,00,000
Total units	3,200	3,850
Overhead per unit	218.75	207.79

Calculation of cost per unit

	Equipment A (₹)	Equipment B (₹)
Direct material cost	300	400
Direct labour cost	360	480
Overheads	218.75	207.79
	928.75	1,087.79

(iii) Statement of cost

	Equipment A (₹)	Equipment B (₹)
Unit manufacturing cost-using direct labour hours as an application base	890	1,120
Unit manufacturing cost-using activity based costing	928.75	1,087.79
Cost distortion	(-) 38.75	+ 32.21

17.

(a) Statement of calculation of machine and labour hours

	X	Y	Z	Total
Production (units) (A)	1,00,000	80,000	60,000	-
Machine hours per unit (B)	3	4	5	-
Machine hours (A×B)	3,00,000	3,20,000	3,00,000	9,20,000
Labour hours per unit (C)	6	4	3	-
Labour hours (A×C)	6,00,000	3,20,000	1,80,000	11,00,000

Machine hour rate = $\frac{73,60,000}{9,20,000}$ = ₹8 per machine hour

Labour hour rate = $\frac{55,00,000}{11,00,000}$ = ₹5 per labour hour

Statement of profit

	X	Y	Z	Total
Production (units) (A)	1,00,000	80,000	60,000	2,40,000
Selling price per unit (B)	90	180	140	-
Sales (C = A×B)	90,00,000	1,44,00,000	84,00,000	3,18,00,000
Direct cost per unit (D)	50	90	95	-
Total Direct Cost (A×D)	50,00,000	72,00,000	57,00,000	1,79,00,000
Overheads:				
Machine department cost	3,00,000 × 8 = 24,00,000	3,20,000 × 8 = 25,60,000	3,00,000 × 8 = 24,00,000	73,60,000
Labour department cost	6,00,000 × 5 = 30,00,000	3,20,000 × 5 = 16,00,000	1,80,000 × 5 = 9,00,000	55,00,000
Total Cost (E)	1,04,00,000	1,13,60,000	90,00,000	3,07,60,000
Profit (C – E)	(14,00,000)	30,40,000	(6,00,000)	10,40,000

(b) Calculation of cost Driver Rate

Cost pool	Amount (₹)	Cost Driver Quantity	Cost Driver Rate (₹)
Machining Services	64,40,000	9,20,000 Machine hours	₹7 per machine hour
Assembly Services	44,00,000	11,00,000 direct labour hours	₹4 per labour hour
Set-up costs	9,00,000	9,000 Machine set-ups	₹100 per machine set-up
Order processing	7,20,000	7,200 Customer orders	₹100 per order
Purchasing	4,00,000	800 Purchase order	₹500 per purchase order

Statement of profit

	X	Y	Z	Total
Production (units) (A)	1,00,000	80,000	60,000	2,40,000
Selling price per unit (B)	90	180	140	-
Sales (C = A×B)	90,00,000	1,44,00,000	84,00,000	3,18,00,000
Direct cost per unit (D)	50	90	95	-
Total Direct Cost (A×D)	50,00,000	72,00,000	57,00,000	1,79,00,000
Overheads:				
Machining services	3,00,000 × 7 = 21,00,000	3,20,000 × 7 = 22,40,000	3,00,000 × 7 = 21,00,000	64,40,000
Assembly services	6,00,000 × 4 = 24,00,000	3,20,000 × 4 = 12,80,000	1,80,000 × 4 = 7,20,000	44,00,000
Machine set-up costs	4,500 × 100 = 4,50,000	3,000 × 100 = 3,00,000	1,500 × 100 = 1,50,000	9,00,000
Order processing cost	2,200 × 100 = 2,20,000	2,400 × 100 = 2,40,000	2,600 × 100 = 2,60,000	7,20,000
Purchasing cost	300 × 500 = 1,50,000	350 × 500 = 1,75,000	150 × 500 = 75,000	4,00,000
Total Cost (E)	1,03,20,000	1,14,35,000	90,05,000	3,07,60,000
Profit (C – E)	(13,20,000)	29,65,000	(6,05,000)	10,40,000

18.

(a) Statement of operating income

Particulars	Market S	Market K	Market M	Total
Revenue per delivery	84,975	28,875	5,445	-
No. of delivery	330	825	2,750	-
Revenue (A)	2,80,41,750	2,38,21,875	1,49,73,750	6,68,37,375
COGS	82,500×330 =2,72,25,000	27,500×825 =2,26,87,500	4,950×2,750 =1,36,12,500	6,35,25,000
Gross Margin (B)	8,16,750	11,34,375	13,61,250	33,12,375
(-) Operating cost	-	-	-	8,27,970
Net Income	-	-	-	24,84,405
Gross Margin % (B ÷ A)	2.91%	4.76%	9.09%	4.96%

(b) Statement of Cost

Particulars	Cost (₹) (A)	Cost Driver (B)	Cost per cost driver (A÷B)
Customer purchase order	2,20,000	5,500 orders	₹40 per order
Line item ordering	1,75,560	58,520 line items	₹3 per line item
Store delivery	1,95,250	3,905 delivery	₹50 per delivery
Cartons dispatched	2,09,000	2,09,000 cartons	₹1 per carton
Shelf-stocking	28,160	1,760 hours	₹16 per hour

(c) Statement of operating income

Particulars	Market S	Market K	Market M
Gross Margin (A) [From (a) part]	8,16,750	11,34,375	13,61,250
Customer purchase order cost	40×385 = 15,400	990×40 = 39,600	4,125×40 = 1,65,000
Line item ordering cost	3×14×385 = 16,170	3×12×990 = 35,640	3×10×4,125 = 1,23,750
Store delivery cost	50×330 = 16,500	50×825 = 41,250	50×2,750 = 1,37,500
Cartons dispatch cost	1×300×330 = 99,000	1×80×825 = 66,000	1×16×2,750 = 44,000
Shelf-stocking cost	16×3×330 = 15,840	16×0.6×825 = 7,920	16×0.1×2,750 = 4,400
Operating cost (B)	1,62,910	1,90,410	4,74,650
Net income (A – B)	6,53,840	9,43,965	8,86,600

Activity based costing shows that Market M uses the large amount of SK Ltd.'s operating cost resources than the other two channels.

19.

(i) (a) Statement of operating income

Particulars	Drug A	Drug B	Drug C	Total
Revenue (A)	74,50,000	1,11,75,000	1,86,25,000	3,72,50,000
COGS	41,44,500	68,16,750	1,20,63,750	2,30,25,000
Gross Margin	33,05,500	43,58,250	65,61,250	1,42,25,000
(-) Operating cost (in COGS Ratio)	16,57,800	27,26,700	48,25,500	92,10,000
Operating Income (B)	16,47,700	16,31,550	17,35,750	50,15,000
Operating income % (B ÷ A)	22.12%	14.60%	9.32%	13.46%

(i) (b) Statement of Cost

Particulars	Cost (₹) (A)	Cost Driver (B)	Cost per cost driver (A÷B)
Ordering	8,30,000	2,000 purchase order	₹415 per purchase order
Delivery	18,20,000	2,800 deliveries	₹650 per delivery
Shelf stocking	32,40,000	4,500 hours of shelf stocking time	₹720 per hour of shelf stocking time
Customer support	28,20,000	4,70,000 units sold	₹6 per unit sold

Statement of operating income

Particulars	Drug A	Drug B	Drug C
Revenue (A)	74,50,000	1,11,75,000	1,86,25,000
COGS	41,44,500	68,16,750	1,20,63,750
Gross Margin (B)	33,05,500	43,58,250	65,61,250
Drug License Fee (in 2:3:5)	1,00,000	1,50,000	2,50,000
Ordering cost	415 × 560 = 2,32,400	415 × 810 = 3,36,150	415 × 630 =2,61,450
Delivery cost	650 × 950 = 6,17,500	650 ×1000 = 6,50,000	650 × 850 = 5,52,500
Shelf Stocking cost	720 × 900 = 6,48,000	720 ×1250 = 9,00,000	720 ×2350 = 16,92,000
Customer support	6 × 175200 = 10,51,200	6 × 150300 = 9,01,800	6 × 144500 = 8,67,000
Operating cost (C)	26,49,100	29,37,950	36,22,950
Operating income (B – C = D)	6,56,400	14,20,300	29,38,300
Operating income % (D÷A)	8.81%	12.71%	15.78%

(ii) When the operating costs are distributed on the basis of cost of goods sold, Drug A has the highest level of operating income percentage because lesser operating cost share is distributed to it.

Activity based costing shows that Drug C uses the large amount of operating cost resources than the other two drugs and simultaneously generates the highest level of revenue and thus operating income percentage is maximum in case of Drug C.

❑❑❑

7 CHAPTER

Cost Accounting System

Integrated Accounting	• It is a system of accounting whereby cost and financial accounts are kept in the same set of books. • Integrated accounting records provide the necessary information for ascertainment of cost of each unit, batch or job or any other cost unit and simultaneously financial statement viz. Profit and Loss A/c and Balance Sheet. • In this system, transactions are recorded based on double entry book-keeping and costs are classified on the basis of function which enables the firm to ascertain product cost.
Advantages of Integrated Accounting System	• No need for reconciliation • Less efforts required • Less time consuming • Economical process i.e; less costly
Essential Pre-requisites of Integrated System	• Deciding the extent of integration of the two sets of books. Some companies find it useful to integrate upto the stage of primary cost or factory cost while others prefer an integration of the entire accounting records. • A suitable coding system must be developed to serve the purpose of both financial and cost accounts. • To lay down the procedure for the treatment of provision for accruals prepaid expenses and other adjustments necessary for preparing interim accounts. • Perfect co-ordination should exist between the staff responsible for financial aspects and cost aspects of the accounts. An efficient processing of accounting documents is to be ensured.
Non-Integrated Accounting System or Inter-locking System	• Under this system, two different sets of records are maintained for Financial Accounts and Cost Accounts. • It is defined as a system in which the cost accounts are distinct from financial accounts, the two sets of accounts being kept continuously in agreement by the use of control accounts or made readily reconcilable by other means. • At the end of each accounting period, it is necessary to reconcile the Cost and Financial Accounts to maintain the accuracy between both sets of books.

Principal Ledgers Maintained Under Non-Integrated System	• **Cost Ledger –** It is the main\principal ledger. This ledger consists of all impersonal accounts and is made self-balancing by maintaining a control account for each of the other three ledgers. • **Stores Ledger/Job Ledger –** This ledger deals with material transaction. It contains a separate account for each item of store (i.e. raw material, components etc.). This account is debited with all purchases of materials for the stores and credited with all issues of materials. The balance of this account represents the cost of unconsumed stores. • **Work-in-Progress Ledger** – In this ledger, separate accounts are maintained for each job/work in progress. Each such account is debited with material cost, wages, direct expenses and production overheads chargeable to the work and is credited with the cost of work completed/finished goods produced. The balance of this account represents the cost of unfinished work. • **Finished goods Ledger –** In this ledger, accounts of completely finished products, jobs are contained. Individual accounts are maintained for each type of finished job, products etc. Each such account is debited with the cost of finished goods and the amount of administration overheads absorbed and is credited with the cost of goods sold. The balance of this account represents the cost of unsold finished goods.
Cost Ledger Control Account	• It is also known as General Ledger Adjustment Account. • This account is operated to make cost ledger self-balancing. • All transactions of income and expenditure, which originate in financial accounts, are entered in this account for eventual transfer to some control account. • Main purpose of this account is to complete entry in cost ledger. No entry should be made direct from financial books to cost books. All entries pass through general ledger adjustment account. • The balance of this account at the end of a particular period represents the total of all balances of impersonal account.
Need for reconciliation	• To find out the reasons for difference in profit or loss in Cost and Financial Accounts. • Reliability of cost and financial data is verified by reconciling both the accounts. • Reconciliation of cost and financial accounts helps in standardization of policies like inventory valuation, overhead absorption, depreciation provision etc. • The accuracy of cost accounting methods and practices followed by the concern like absorption and recovery of overheads, depreciation allowance, inventory valuation is cross verified with the financial accounts. • It promotes co-operation and co-ordination between the two accounts. • To ensure that there is no over or under recovery of overheads • It helps the management in identifying the reasons for deviation in profits of the two accounts for internal control and efficient management of operations.

No Requirement of Reconciliation	• When the cost and financial accounts are integrated then there is no need to have a separate reconciliation statement between the two sets of accounts.
Reasons for Difference in Costing and Financial Profit/ Loss	• **Items shown only in financial accounts** (*a*) Purely financial charges • Loss on sale of capital assets • Interest on bank loans and mortgages etc. • Fines and penalties • Amount written off for goodwill or preliminary expenses. (*b*) Purely financial incomes • Profit from sale of capital assets • Rent received/receivable • Interest or dividend received (*c*) Appropriations of profit • Dividend paid • Transfer to reserves • Income tax • **Items shown only in cost accounts -** These are usually notional charges called as imputed costs/opportunity costs. Example: • Salary or own manager at notional figures though not incurred. • A charge in lieu of rent when premises are owned and no rent is payable. • **Under or over-absorption of overheads in cost accounts –** In cost accounts, overheads are recovered on pre-determined basis whereas under financial accounts, overheads are charged on actual basis, thus leading to the difference between the two. • **Different basis of stock valuation –** Basis of stock valuation in cost and financial accounts may be different leading to a difference in the profits. In cost accounts, stock will be valued at FIFO, LIFO or average stock etc. but in financial accounts the principle is cost or market value whichever is lower. • **Basis of depreciation –** Different methods of providing depreciation adopted in two sets of books may also lead to some difference in the profit of loss figures.

PRACTICAL QUESTIONS

1. Journalise the following transactions assuming cost and financial accounts are integrated: **[SM]**

	₹
Raw materials purchases	20,000
Direct Materials issued to production	15,000
Wages paid (30% indirect)	12,000
Direct wages charged to production	8,400
Manufacturing expenses incurred	9,500

	₹
Manufacturing overheads charged to production	9,200
Selling and Distribution costs	2,000
Finished Products (at cost)	20,000
Sales	29,000
Closing stock	Nil
Receipts from Debtors	6,900
Payment to Creditors	11,000

2. Pass journal entries in the cost books, maintained on non-integrated system, for the following:

(*a*) Issue of materials — Direct ₹5,50,000, Indirect ₹1,50,000

(*b*) Allocation of wages — Direct ₹2,00,000, Indirect ₹40,000

(*c*) Under/Over absorbed overheads: — Factory (over) ₹20,000;

3. Journalise the following transactions assuming cost and financial accounts are integrated:

[Nov 2013, MTP July 2020]

	₹
(*i*) Material issued	
Direct	3,25,000
Indirect	1,15,000
(*ii*) Allocation of wages (25% indirect)	6,50,000
(*iii*) Under/Over absorbed overheads:	
Factory (Over)	2,50,000
Administration (Under)	1,75,000
(*iv*) Payment to Sundry Creditors	1,50,000
(*v*) Collection from Sundry Debtors	2,00,000

4. Enter the following transactions relating to SK & Co. for the month of March, in the financial and cost books:

	₹	₹
Wages and salaries		20,000
Less Deductions:		
Employee Provident Fund	1,600	
State Insurance Premium	800	
Income Tax	200	2,600
Net wages paid		17,400
Employer's Contribution is as follows:		
Provident fund	1,600	
State Insurance	400	2,000

From the wages and salaries analysis, following details of total wages and salaries are available:

	₹	₹
Direct labour	12,000	
Indirect factory labour	5,800	
Salaries to administration staff	2,600	
Salaries to selling and distribution staff	1,600	22,000

5. SK Manufacturing Co. Ltd. opens the costing records, with the balances as on 1st July, 2021 as follows:

	(₹)	(₹)
Material Control A/c	1,24,000	-
Work-in-Process Control A/c	62,500	-
Finished Goods Control A/c	1,24,000	-
Production Overhead Control A/c	8,400	-
Administrative Overhead Control A/c	-	12,000
Selling & Distribution Overhead Control A/c	6,250	-
Cost Ledger Control A/c	-	3,13,150
	3,25,150	**3,25,150**

The following are the transactions for the quarter ended 30th September 2021:

	(₹)
Materials purchased	4,80,100
Materials issued to jobs	4,77,400
Materials to works maintenance	41,200
Materials to administration office	3,400
Materials to selling department	7,200
Wages direct	1,49,300
Wages indirect	65,000
Transportation for indirect materials	8,400
Production overheads	2,42,250
Absorbed production overheads	3,59,100
Administration overheads	74,000
Administration allocation to production	52,900
Administration allocation to sales	14,800
Sales overheads	64,200
Sales overheads absorbed	82,000
Finished goods produced	9,58,400
Finished goods sold	9,77,300
Sales	14,43,000

Make up the various accounts as you envisage in the Cost Ledger and prepare a Trial Balance as at 30th September, 2021.

6. On 31st March, the following balances were extracted from the books of the SK Company:

	Debit (₹)	**Credit (₹)**
Stores Ledger Control A/c	35,000	
Work-in-progress Control A/c	38,000	
Finished Goods Control A/c	25,000	
Cost Ledger Control A/c	--------	98,000
	98,000	98,000

The following transactions took place in April:

	₹
Material purchased	95,000
Material returned to suppliers	3,000
Material issued to production	98,000
Material returned to stores	3,000
Productive wages	40,000
Indirect labour	25,000
Factory overhead expenses incurred	50,000
Selling and Administrative expenses	40,000
Cost of finished goods transferred to warehouse	2,13,000
Cost of goods sold	2,10,000
Sales	3,00,000

Factory overheads are supplied to production at 150% of direct wages, any under/over absorbed overhead being carried and charged off to the Profit and Loss Account for the month in which they are incurred. Show the following accounts:

(a) Cost ledger control a/c
(b) Stores ledger control a/c
(c) Work in progress control a/c
(d) Finished goods stock control a/c
(e) Factory overhead control a/c
(f) Costing profit and loss a/c
(g) Trial balance as at 30th April

7. A manufacturing business has a single production department. It absorbs production overheads into costs on a direct labour hour basis. The production overhead budget for the year ending 31st March was ₹8,00,000 and budgeted direct labour hours were 1,00,000.

During the year to 31st March, the following costs were incurred:

	₹
Direct materials	4,20,000
Indirect materials	40,000
Direct labour	7,50,000
Indirect labour	3,15,000
Indirect expenses	5,05,000

Opening stock of work-in-progress was ₹90,000 and closing work-in-progress was ₹70,000. The number of labour hours worked was 1,10,000 hours.

You are required to:

(*a*) Prepare the production overhead account

(*b*) Prepare the work-in-progress account

(*c*) Prepare the under-over-absorbed overhead account (Overhead adjustment A/c)

8. A fire destroyed some accounting records of a company. You have been able to collect the following from the spoilt papers/records and as a result of consultation with accounting staff in respect of January: **[SM]**

(i) Incomplete Ledger Entries

Raw Material A/c			
	₹		₹
Beginning Inventory	32,000		

Work in Progress A/c			
	₹		₹
Beginning Inventory	9,200	Finished Stock	151000

Creditors A/c			
	₹		₹
Closing Balance	19,200	Opening Balance	16400

Manufacturing Overheads A/c			
	₹		₹
Amount Spent	29,600		

Finished Goods A/c			
	₹		₹
Opening Inventory	24,000	Closing Inventory	30000

(ii) Additional Information:

(a) The cash book showed that ₹89,200 have been paid to creditors for raw material

(b) Ending inventory of work in progress included material ₹5,000 on which 300 direct labour hours have been booked against wages and overheads

(c) The job card showed that workers have worked for 7,000 hours. The wage rate is ₹10 per labour hour.

(d) Overhead recovery rate was ₹4 per direct labour hour.

You are required to complete the above accounts in the cost ledger of the company.

9. SK Ltd. keeps books on integrated accounting system. The following balances appear in the books as on 1st January:

	Dr. (₹)	Cr. (₹)
Stores Control A/c	18,000	
Work-in-progress A/c	17,000	
Finished goods A/c	13,000	
Bank A/c	10,000	
Creditors A/c		8,000
Fixed Assets A/c	55,000	
Debtors A/c	12,000	
Share Capital A/c		80,000
Depreciation provision A/c		5,000
Profit & Loss A/c		32,000
	1,25,000	1,25,000

Transactions for the year ended 31st December, were as given below:

	₹	₹
Wages-direct	87,000	
Wages-indirect	5,000	92,000
Purchase of materials (on credit)		1,00,000
Materials issued to production		1,10,000
Materials for repairs		2,000
Goods finished during the year (at cost)		2,15,000
Sales (credit)		3,00,000
Cost of goods sold		2,20,000
Production overhead absorbed		48,000
Production overheads incurred		40,000
Administration overhead incurred		12,000
Selling overhead incurred		14,000
Payments of creditors		1,01,000
Payments of debtors		2,90,000
Depreciation of machinery		1,300
Prepaid rent (included in factory overheads)		300

Write up accounts in the integrated ledger and prepare a trial balance.

10. In the absence of the Chief Accountant, you have been asked to prepare a month's cost accounts for a company which operates a batch costing system fully integrated with the financial accounts. The following relevant information is provided to you: **[SM]**

	(₹)	(₹)
Balances at the beginning of the month:		
Stores Ledger Control Account		25,000
WIP Ledger Control Account		20,000
Finished goods Ledger Control Account		35,000
Prepaid Production overheads brought forward from previous month		3,000
Transactions during the month:		
Material purchased		75,000
Materials issued:		
To production	30,000	
To factory maintenance	4,000	34,000
Material transferred between batches		5,000
Total wages paid:		
To direct workers	25,000	
To indirect workers	5,000	30,000
Direct wages charged to batches		20,000
Recorded and non-productive time of direct workers		5,000
Selling and Distribution Overhead incurred		6,000
Other production overheads incurred		12,000
Sales		1,00,000
Cost of finished goods sold		80,000
Cost of goods completed and transferred into finished goods during the month		65,000
Physical value of work-in-process at the end of the month		40,000

The production overhead absorption rate is 150% of direct wages charged to work-in-process. Required to prepare the following accounts for the month:

(a) Stores Ledger Control Account

(b) Work-in-Process Control Account

(c) Finished Goods Control account

(d) Production Overhead Control Account

(e) Costing Profit & Loss Account

11. A company operates on historic job cost accounting system, which is not integrated with the financial accounts. At the beginning of a month, the opening balances in cost ledger were:

[SM, RTP Dec 2021]

		₹(in lakhs)
Stores Ledger Control Account		80
Work-in-progress Control Account		20
Finished goods Control Account		430
Building Construction Account		10
Cost Ledger Control Account		540

During the month, the following transactions took place:

Materials-	Purchased	40
	Issued to production	50
	Issued to maintenance	6
	Issued to building construction	4
Wages-	Gross wages paid	150
	Indirect wages	40
	For building construction	10
Works Overheads-	Actual amount incurred (excluding items shown above)	160
	Absorbed in building construction	20
	Under absorbed	8
Royalty paid on production		5
Selling, distribution and administration overheads		25
Sales		450

At the end of the month, the stock of raw material and work-in-progress was ₹55 lakhs and ₹25 lakhs respectively. The loss arising in the raw material account is treated as factory overheads. The building under construction was completed during the month. Company's gross profit margin is 20% on sales. Prepare the relevant control accounts to record the above transactions in the cost ledger of the company.

12. The following figures have been extracted from the cost record of a manufacturing company:

Stores	₹
Opening balances	63,000
Purchases	3,36,000
Transfer from Work-in-progress	1,68,000
Issue for Work-in-progress	3,36,000
Issue for repairs and maintenance	42,000
Deficiencies found in stock taking	12,600
Work-in-progress:	
Opening balances	1,26,000
Direct Wages applied	1,26,000
Overhead Applied	5,04,000
Closing Balance	84,000

Finished Products: Entire output is sold at a profit of 10% on actual cost from work-in-progress.

Others: Wages incurred ₹1,47,000; Overhead incurred ₹5,25,000; Income from investment ₹21,000; Loss on sale of fixed assets ₹42,000.

Draw the stores control account, work-in-progress control account, costing profit and loss account, profit and loss account and reconciliation statement.

13. SK Ltd. has furnished its Profit and Loss account for the year ended 31st March, and also given a statement showing reconciliation between the profit as per financial records and cost records. The profit and loss account is given below:

Profit and Loss account for the year ended 31st March

Particulars	₹	Particulars	₹
To Opening stock		By Sales	17,80,000
Raw Materials	95,500	By Closing Stock	
WIP	45,000	Raw Materials	99,000
Finished goods	78,000	WIP	58,000
To Purchases	6,42,000	Finished goods	80,000
To Direct Wages	2,22,000	By Dividend received on shares	1,65,000
To Factory overheads	2,45,000		
To Administrative Expenses	1,98,500		
To Selling Expenses	3,42,000		
To Goodwill written off	80,000		
To Interest on loans	50,000		
To Legal Charges	42,000		
To Net Profit	1,42,000		
Total	**21,82,000**	**Total**	**21,82,000**

Reconciliation statement as on 31st March is given below:

	₹	₹
Profit as per financial records		1,42,000
Add:		
Raw Material - Closing stock	1,500	
WIP - Opening Stock	2,000	
Finished goods - Opening Stock	3,000	
Finished goods - closing stock	1,000	
Goodwill written off	80,000	
Interest on loans	50,000	

	₹	₹
Legal charges	42,000	1,79,500
Less:		
Raw material - Opening Stock	2,500	
WIP - closing stock	3,500	
Dividend received on shares	1,65,000	1,71,000
Profits as per cost records		1,50,500

You are required to draw up the following accounts in the cost ledger of SK Ltd.

(a) Material Control Account
(b) WIP Control Account
(c) Finished goods control account
(d) Cost of sales account
(*e*) Costing profit and loss account

14. A manufacturing company has disclosed net loss of ₹48,700 as per their cost accounting records for the year ended 31st March, 2014. However, their financial accounting records disclosed net profit of ₹35,400 for the same period. A scrutiny of data of both the sets of books of accounts revealed the following information: **[May 2014]**

	₹
(i) Factory overheads under absorbed	30,500
(ii) Administrative overheads over absorbed	65,000
(iii) Depreciation charged in financial accounts	2,25,000
(iv) Depreciation charged in cost accounts	2,70,000
(v) Income tax provision	52,400
(vi) Transfer fee (credited in financial accounts)	10,200
(vii) Obsolescence loss charged in financial accounts	20,700
(viii) Notional rent of own premises charged in cost accounts	54,000
(ix) Value of opening stock:	
(a) in cost accounts	1,38,000
(b) in financial accounts	1,15,000
(x) Value of closing stock:	
(a) in cost accounts	1,22,000
(b) in financial accounts	1,12,500

Prepare a memorandum reconciliation account by taking costing loss as base.

15. SK company showed a net loss of ₹4,16,000 as per their financial accounts for the year ended 31st March. The cost accounts, however, disclosed a net loss of ₹3,28,000 for the same period. The following information was revealed as a result of scrutiny of the figures of both the sets of books: **[SM]**

(a) Factory overheads under-recovered	₹6,000
(b) Administration overheads over-recovered	₹4,000
(c) Depreciation charged in financial accounts	₹1,20,000

(d) Depreciation recovered in costs ₹1,30,000
(e) Interest on investment not included in costs ₹20,000
(f) Income tax provided ₹1,20,000
(g) Transfer fees (credit in financial books) 2,000
(h) Stores adjustment (credit in financial books) 2,000

Prepare a memorandum reconciliation account.

16. The cost accountant of a company has arrived at a profit of ₹73,24,150 based on cost accounting records for the year. As cost auditor, you find the following differences between financial accounts and cost accounts.

(a) Decrease in value of
WIP and Finished goods as per F/A ₹1,28,21,995
As per cost accounts ₹1,31,04,220
(b) Profit on sale of fixed assets ₹61,500
(c) Loss on sale of investments ₹11,200
(d) Voluntary retirement compensation included in salaries and Wages in F/A ₹16,75,000
(e) Donation paid ₹25,000
(f) Major repairs and maintenance written off in F/A ₹13,26,000
Amount in Cost Accounts ₹6,08,420
(g) Insurance claim relating to previous year received during the year ₹14,29,000
(h) Profit from retail trading activity ₹7,12,300

You are required to prepare a reconciliation statement between the profit figures as per costing and financial accounts. Calculate the profit as per financial books.

17. M/s SK Ltd. has furnished you the following information from the financial books for the year ended 31st March:

	₹		₹
Opening Stock of finished goods		Sales (10,250 units)	358,750
500 units @ ₹17.50 each	8,750	Closing stock of finished goods	
Material consumed	130,000	250 units @ ₹25 each	6,250
Wages	75,000		
Gross Profit c/d	151,250		
	365,000		**365,000**
Factory Overheads	47,375	By Gross Profit b/d	151,250
Administration Overheads	53,000	Interest	125
Selling Expenses	27,500	Rent received	5,000
Bad Debts	2,000		
Preliminary Expenses	2,500		
To Net Profit	24,000		
	156,375		**156,375**

The cost sheet shows:

(a) The cost of materials as ₹13 per unit;

(b) The labour cost as ₹7.50 per unit;

(c) The factory overheads are absorbed at 60% of labour cost;

(d) The administration overheads are absorbed at 20% of factory cost;

(e) selling expenses are charged at ₹3 per unit;

(f) The opening stock of finished goods is valued at ₹22.50 per unit.

You are required to prepare:

(i) The cost sheet showing the number of units produced and the cost of production, by elements of costs, per unit and in total.

(ii) The statement of profit or loss as per cost accounts for the year ended 31st March

(iii) The statement showing the reconciliation of profit or loss as shown by the cost accounts with the profit as shown by the financial accounts.

18. SK Company Limited furnishes the summary of Trading and Profit & Loss Account for the year ended 31st December:

	₹			₹
To Raw Materials	139,600	By Sales (12,000 units)		480,000
To Direct Wages	76,200	By Finished Stock (200 Units)		8,000
To Production Overheads	42,600	By Work-in-progress:		
To Administration OHs	39,100	Materials	28,200	
To Selling and Distribution OHs	42,700	Wages	11,796	
To Preliminary Expenses written off	2,200	Production Overheads	7,999	47,995
To Goodwill Written off	2,501	By Interest on Securities		6,000
To Dividends (Net)	3,000			
To Income-tax	4,100			
To Net Profit	189,994			
	541,995			**541,995**

The company manufactures a standard unit, scrutiny of cost records for the same period shows that:

(a) Factory overheads have been allocated to the production at 20% on prime Cost

(b) Administration overheads have been charged at ₹3 per unit on units produced.

(c) Selling and distribution expenses have been charged at ₹4 per unit on units sold.

You are required to prepare a statement of cost to work out profit as per Cost Accounts and to reconcile the same with that shown in the financial accounts.

19. The Profit & loss Account of SK Ltd. for the year ended 31st March, is as follows:

	₹			₹
To Material	480,000	By Sales		960,000
To Wages	360,000	By Closing Stock		180,000
To Factory Expenses	240,000	By Work in progress:		
To Gross Profit	120,000	Materials	30,000	
		Wages	18,000	
		Factory Expenses	12,000	60,000
	1,200,000			**1,200,000**
To Administrative expenses	60,000	By Gross Profit b/d		120,000
To Net Profit	66,000	By Dividend received		6,000
	126,000			**126,000**

As per the costing records the indirect factory overheads have been absorbed at ₹30 per kg and administrative overheads at ₹15 per kg. During the year 6,000 kgs were manufactured and 4,800 kgs were sold. Prepare Costing P&L A/c and reconcile the costing profit with the financial profit.

20. From the information given below, prepare

(a) a statement showing costing profit or loss; and

(b) another statement reconciling the costing profits with those shown by financial accounts:

	₹		₹
Materials	150,000	Sales (1,50,000 units)	300,000
Direct Wages	75,000		
Indirect Factory Expenses	45,000		
Office Expenses	13,500		
Selling and Distribution Expenses	9,000		
Net Profit	7,500		
	300,000		**300,000**

The normal output of the factory is 2,25,000 units. Factory expenses of a fixed nature are ₹27,000. Office expenses are for all practical purposes constant. Selling and distribution expenses are constant to the extent of ₹3,000 and the balance varies with sales.

21. SK Co. manufactures two sizes of machine components, Size A and B. The following data refer to the year ended March 31st:

	Size A	Size B
Production	125 units	400 units
Sales	120 units	360 units
Wages cost per unit	₹40	₹30
Material cost per unit	₹15	₹12
Selling price per unit	₹125	₹90

All expenses other than wages and materials are analyzed under 'works overheads' which during the year amounted to ₹9,000 and 'office overheads' which amounted to ₹10,000. In fixing the selling price it was estimated that works overheads should be taken at 50% on wages and office overhead expenses at 33(1/3)% on work cost.

You are required to compute the following:

(a) The total cost of each unit on the basis of the above overhead percentages;

(b) The net profit for the year shown by the financial accounts, valuing unsold stocks at actual material and wages cost plus works overhead at 50% on wages; and

(c) The reconciliation of net profit in (b) above with the estimated total net profit based on cost figures.

PRACTICE QUESTIONS

22. Journalize the following transactions assuming the cost and financial accounts are integrated: **[May 2022]**

Particulars	Amount (₹)
Direct Materials issued to production	₹5,58,000
Allocation of Wages (Indirect)	₹7,50,000
Factory Overheads (Over absorbed)	₹2,25,000
Administrative Overheads (Under absorbed)	₹1,55,000
Deficiency found in stock of Raw material (Normal)	₹2,00,000

23. As at 31st March, 2022, the following balances existed in a firm's cost ledger: **[SM]**

	Dr. (₹)	Cr. (₹)
Stores Ledger Control a/c	3,01,435	-
Work-in-process Control a/c	1,22,365	-
Finished Stock Ledger Control a/c	2,51,945	-
Manufacturing overhead Control a/c	-	10,525
Cost Ledger Control a/c	-	6,65,220
	6,75,745	**6,75,745**

During the next three months the following items arose:

	(₹)
Finished product (at cost)	2,10,835
Manufacturing overhead incurred	91,510
Raw materials purchased	1,23,000
Factory wages	50,530
Indirect labour	21,665
Cost of sales	1,85,890
Material issued to production	1,27,315
Sales returned at cost	5,380
Material returned to suppliers	2,900
Manufacturing overhead charged to production	77,200

You are required to pass the journal entries. Write up the accounts and schedule the balances, stating what each balance represents.

24. The following are the balances existed in the books of JPG Ltd. for the year ended, 31st March, 2019: **[RTP May 2020]**

Particulars	Dr. (₹)	Cr. (₹)
Stores Ledger Control A/c	30,00,000	
WIP Control A/c	15,00,000	
Finished goods Control A/c	25,00,000	
Manufacturing Overheads Control A/c		1,50,000
Cost Ledger Control A/c		68,50,000

During the year 2019-20, the following transactions took place:

Particulars	Amount (₹)
Finished Product (at cost)	22,50,000
Manufacturing Overhead incurred	8,50,000
Raw material purchased	12,50,000
Factory wages	4,00,000
Indirect labour	2,00,000
Cost of sales	17,50,000
Materials issued to production	13,50,000
Sales returned (at cost)	90,000
Material returned to suppliers	1,30,000
Manufacturing overhead charged to production	8,50,000

Required:

Prepare the following control accounts and Trial Balance at the end of the year.

Cost Ledger, Stores Ledger, Work-in-process, Finished Stock, Manufacturing Overhead, Wages and Cost of sales.

25. The following balances were extracted from a Company's ledger as on 30th June, 2018 **[Nov 2018]**

	Debit (₹)	Credit (₹)
Raw material control A/c	2,82,450	
Work-in-progress control A/c	2,38,300	
Finished stock control A/c	3,92,500	
General ledger adjustment A/c		9,13,250
	9,13,250	**9,13,250**

The following transactions took place during the quarter ended 30th September, 2018:

	₹
Factory overheads – allocated to work-in-progress	1,36,350
Goods finished – at cost	13,76,200
Raw material purchased	12,43,810

	₹
Direct wages – allocated to work-in-progress	2,56,800
Cost of goods sold	14,56,500
Raw materials – issued to production	13,60,430
Raw materials – credited by suppliers	27,200
Raw materials losses – inventory audit	6,000
Work-in-progress rejected (with no scrap value)	12,300
Customer's returns (at cost) of finished goods	45,900

You are required to prepare:

(i) Raw material control a/c

(ii) Work-in-progress control a/c

(iii) Finished stock control a/c

(iv) General ledger adjustment a/c

26. From the following details show the necessary accounts in the Cost Ledger:

	Materials	W.I.P	Finished Stock
Opening Balance	8,000	5,000	10,000
Closing Balance	11,000	9,000	12,000

Transactions during the period	₹
Material purchased	25,000
Wages paid (including ₹2,000 indirect)	10,000
Overheads incurred	8,000
Overheads absorbed	9,000
Sales	50,000

27. Following are the figures extracted form the Cost Ledger of a manufacturing unit: **[SM]**

Stores	₹
Opening balance	15,000
Purchases	80,000
Transfer from WIP	40,000
Issue to WIP	80,000
Issue to repairs and maintenance	10,000
Sold as a special case at cost	5,000
Shortage in the year	3,000

Stores	₹
Work-in-Process:	
Opening inventory	30,000
Direct labour cost charged	30,000
Overhead cost charged	1,20,000
Closing balance	20,000
Finished Products:	
Entire output is sold at 10% profit on actual cost from work-in-process.	
Others:	
Wages for the period	35,000
Overhead expenses	1,25,000
Ascertain the profit or loss as per financial accounts and cost accounts and reconcile them.	

28. The following incomplete accounts are furnished to you for the month ended 31st March: **[SM]**

Stores control Account			
	₹		₹
1.03 To Balance b/d	54,000		

Work in Progress Control Account			
	₹		₹
1.03 To Balance b/d	6,000		

Finished goods control Account			
	₹		₹
1.03 To Balance b/d	75,000		

Factory overhead control Account			
	₹		₹
Total Debits for March	45,000		

Creditors Account			
	₹		₹
		1.03 To Balance b/d	30,000

Additional Information:

(a) The factory overheads are applied by using a budgeted rate based on direct labour hours. The budget for overheads for the year is ₹6,75,000 and budget of direct labour hours is 4,50,000.

(b) The balance in the account of creditors on 31st March is ₹15,000 and payments made to creditors in March, amount to ₹1,05,000.

(c) The finished goods inventory as on 31st March, is ₹66,000.
(d) The cost of goods sold during the month was ₹1,95,000.
(e) On 31st March, there was only one unfinished job in the factory. The cost records show that ₹3,000 (1,200 direct labour hours) of direct labour cost and ₹6,000 of direct material cost had been charged.
(f) A total of 28,200 direct labour hours were worked in March. All factory workers earn same rate of pay.
(g) All actual factory overheads incurred in March, have been posted.

You are required to find:

(1) Materials purchased during March.
(2) Cost of goods completed in March.
(3) Overheads applied to production in March.
(4) Balance of work in progress on 31st March.
(5) Direct materials consumed during March.
(6) Balance of Stores Control Account on 31st March.
(7) Over-absorbed or under-absorbed overheads for March.

29. R Limited showed a net loss of ₹35,400 as per their cost accounts for the year ended 31st march, 2012. However, the financial accounts disclosed a net profit of ₹67,800 for the same period. The following information were revealed as a result of scrutiny of the figures of cost accounts and financial accounts: **[Nov 2012]**

		₹
(a)	Administrative overhead under recovered	25,500
(b)	Factory overhead over recovered	1,35,000
(c)	Depreciation under charged in cost accounts	26,000
(d)	Dividend received	20,000
(e)	Loss due to obsolescence charged in Financial Accounts	16,800
(f)	Income tax provided	43,600
(g)	Bank interest credited in Financial Accounts	13,600
(h)	Value of opening stock	
	In Cost Accounts	1,65,000
	In Financial Accounts	1,45,000
(i)	Value of closing stock	
	In Cost Accounts	1,25,500
	In Financial Accounts	1,32,000
(j)	Goodwill written-off in Financial Accounts	25,000
(k)	Notional rent of own premises charged in Cost Accounts	60,000
(l)	Provision for doubtful debts in Financial Accounts	15,000

Prepare a reconciliation statement by taking costing net loss as base.

30. A manufacturing company has disclosed a net loss of ₹2,25,000 as per their cost accounting records for the year ended March 31, 2019. However, their financial accounting records disclosed a net loss of ₹2,70,000 for the same period. A scrutiny of data of both the sets of books of accounts revealed the following information:

		₹
(i)	Factory overheads under-absorbed	5,000
(ii)	Administration overheads over-absorbed	3,000
(iii)	Depreciation charged in financial accounts	70,000
(iv)	Depreciation charged in cost accounts	80,000
(v)	Interest on investments not included in cost accounts	20,000
(vi)	Income tax provided in financial accounts	65,000
(vii)	Transfer fees (credit in financial accounts)	2,000
(viii)	Preliminary expenses written off	3,000
(ix)	Over-valuation of closing stock of finished goods in cost accounts	7,000

Required: Prepare a Memorandum Reconciliation Account.

31. A manufacturing company has disclosed a net loss of ₹3,47,000 as per their cost accounts for the year ended March 31, 2018. The financial accounts however disclosed a net loss of ₹5,10,000 for the same period. The following information was revealed as a result of scrutiny of the figures of both the sets of accounts.

		₹
(i)	Factory overheads under-absorbed	40,000
(ii)	Administration overheads over-absorbed	60,000
(iii)	Depreciation charged in financial accounts	3,25,000
(iv)	Depreciation charged in cost accounts	2,75,000
(v)	Interest on investments not included in cost accounts	96,000
(vi)	Income tax provided	54,000
(vii)	Interest on loan funds in Financial Accounts	2,45,000
(viii)	Transfer fees (credit in financial accounts)	24,000
(ix)	Stores adjustment (credit in financial books)	14,000
(x)	Dividend received	32,000

Required: Prepare a Memorandum Reconciliation Account.

32. M/s Abid Private Limited disclosed a net profit of ₹48,408 as per cost books for the year ending 31st March 2019. However, financial accounts disclosed net loss of ₹15,000 for the same period. On scrutinizing both the set of books of accounts, the following information was revealed:

[May 2019]

Works overheads under recovered in cost books	48,600
Office overheads over-recovered in cost books	11,500
Dividend received on shares	17,475
Interest on fixed deposits	21,650
Provision for doubtful debts	17,800
Obsolescence loss not charged in cost accounts	17,200
Stores adjustments (debited in financial accounts)	35,433
Depreciation charged in financial accounts	30,000
Depreciation recovered in cos books	35,000

Prepare a Memorandum Reconciliation Account.

33. The net loss of Waywell Ltd. appeared at ₹1,18,500 as per cost records for the year ending 31.03.2019. The following information was revealed as a result of scrutiny of the figures of financial and cost records: **[May 2019]**

	Amount (₹)
Factory overheads over absorbed in cost accounts	32,500
Administrative overheads under absorbed in cost accounts	38,250
Depreciation charged in financial accounts	4,55,800
Depreciation recovered in cost accounts	4,99,700
Loss due to obsolescence charged in financial accounts	11,400
Income tax provision made in financial accounts	32,650
Interest on investments not included in cost accounts	96,000
Store adjustment (Credit) in financial accounts	12,800
Value of opening stock in Cost accounts	18,85,600
Financial accounts	19,62,500
Value of closing stock in Cost accounts	21,15,800
Financial accounts	21,98,900
Imputed rent charged in cost accounts	1,80,000
Selling and distribution expenses not charged in cost accounts	72,450
Donation to Prime Minister Relief Fund	11,000
Loss on sale of furniture	7,250
Bad debts written off	18,300

Required: Prepare a reconciliation statement and arrive at the profit or loss as per financial accounts.

34. GK Ltd. showed net loss of ₹2,43,300 as per their financial accounts for the year ended 31st March, 2018. However, cost accounts disclosed net loss of ₹2,48,300 for the same period. On scrutinizing both the set of books of accounts, the following information were revealed:

[May 2018]

		₹
(i)	Works overheads over recovered	30,400
(ii)	Selling overheads under recovered	20,300
(iii)	Administrative overheads under recovered	27,700
(iv)	Depreciation over charged in cost accounts	35,100
(v)	Bad debts w/off in financial accounts	15,000
(vi)	Preliminary expenses w/off in financial accounts	5,000
(vii)	Interest credited during the year in financial accounts	7,500

Prepare a reconciliation statement reconciling losses shown by financial and cost accounts by taking costing net loss as base.

35. In a factory, work overheads are absorbed at 60% of labour cost and office overheads at 20% of work cost. Prepare

(i) cost sheet,

(ii) Trading and Profit & Loss Account and

(iii) Reconciliation Statement if total expenditure consists of Materials ₹2,00,000; Wages ₹1,50,000; Factory Expenses ₹1,00,000 and Office expenses ₹85,000. 10% of the output is stock at the end and sales are ₹5,20,000.

36. The following figures are available from the financial records of ABC Manufacturing Co. Ltd. for the year ended 31st March:

	(₹)
Sales (20,000 units)	25,00,000
Materials	10,00,000
Wages	5,00,000
Factory Overheads	4,50,000
Administrative Overhead (production related)	2,60,000
Selling and distribution Overheads	1,80,000
Finished goods (1,230 units)	1,50,000

	(₹)	(₹)
Work-in-Process:		
Material	30,000	
Labour	20,000	
Factory overheads	20,000	70,000

	(₹)	(₹)
Goodwill written off		2,00,000
Interest on loan		20,000

In the costing records, factory overheads is charged at 100% of wages, administrative overheads 10% of factory cost and selling and distribution overheads at the rate of ₹10 per unit sold.

Prepare s statement reconciling the profit as per cost records with the profit as per financial records.

37. During the year a company's profits have been estimated from the costing system to be ₹46,126, whereas the final accounts prepared by the auditors disclose a profit of ₹33,248. Given the following information, you are required to prepare a reconciliation statement showing clearly the reasons for the difference:

PROFIT AND LOSS ACCOUNT

For the year ended 31st March

	₹			₹
To opening Stock	494,358		By Sales	693,000
To Purchases	164,308			
	658666			
Less : Closing Stock	150,242			
		508,424		
To Direct Wages		46,266		
To Factory Overheads		41,652		
To Gross Profit c/d		96,658		
		693,000		693,000
To Administrative expenses		19,690	By Gross Profit b/d	96,658
To Selling expenses		44,352	By Sundry Incomes	632
To Net Profit		33,248		
		97,290		**97,290**

Stock Ledger closing balance is ₹156,394;

(a) Credit balance in Wages Control A/c is ₹49,734;

(b) Credit balance in Factory Overhead Control A/c is ₹39,428;

(c) Administration expenses are charged to sales at 3% of selling price in cost accounts;

(d) Selling price includes 5% (on sales) provision or selling expenses;

(e) Sundry incomes are not considered in Cost Accounts

38. The following is the summarized Trading and Profit and Loss Account of XYZ Ltd. for the year ended 31st March, 2019:

Particulars	Amount (₹)	Particulars		Amount (₹)
Direct Material	14,16,000	Sales (30,000 units)		30,00,000
Direct Wages	7,42,000	Finished stock (2,000 units)		1,67,500
Works Overheads	4,26,000	Work-in-progress:		
Administration Overheads	1,50,000	Materials	34,000	
Selling & distribution overheads	1,65,000	Wages	16,000	
Net Profit for the year	3,22,500	Work overheads	4,000	54,000
	32,21,500			**32,21,500**

The company's cost records show that in course of manufacturing a standard unit (i) works overheads have been charged @ 20% on prime cost, (ii) administration overheads are related with production activities and are recovered at ₹5 per finished unit, and (iii) selling and distribution overheads are recovered at ₹6 per unit sold.

You are required to prepare:

(i) Costing Profit and Loss Account indicating the net profits

(ii) A statement showing reconciliation between profit as disclosed by the Cost Accounts and Financial Accounts

39. The following figures have been extracted from the financial accounts of a manufacturing firm for the first year of its operation: **[SM]**

	(₹)
Direct Material Consumption	50,00,000
Direct Wages	30,00,000
Factory Overheads	16,00,000
General administrative overheads	7,00,000
Selling and Distribution Overheads	9,60,000
Bad debts	80,000
Preliminary expenses written off	40,000
Legal charges	10,000
Dividends received	1,00,000
Interest received on deposits	20,000
Sales (1,20,000 units)	1,20,00,000
Closing stock:	
Finished goods (4,000 units)	3,20,000
Work-in-Process	2,40,000

The cost accounts for the same period reveal that the direct material consumption was ₹56,00,000. Factory overheads is recovered at 20% on prime cost. Administration overheads is recovered at ₹6 per unit of goods sold. Selling and distribution overheads are recovered at ₹8 per unit sold.

Prepare the profit and loss accounts both as per financial records and as per cost records. Reconcile the profits as per the two records.

40. The financial books of a company reveal the following data for the year ended 31st March, 2018:

[RTP May 2021]

Particulars	₹
Opening Stock:	
Finished goods 625 units	53,125
Work-in-process	46,000
01.04.2017 to 31.03.2018	
Raw materials consumed	8,40,000
Direct labour	6,10,000
Factory overheads	4,22,000
Administration overheads (production related)	1,98,000
Dividend paid	1,22,000
Bad Debts	18,000
Selling and Distribution Overheads	72,000
Interest received	38,000
Rent received	46,000
Sales 12,615 units	22,80,000
Closing stock: Finished goods 415 units	45,650
Work-in-process	41,200

The cost records provide as under:

- Factory overheads are absorbed at 70% of direct wages
- Administration overheads are recovered at 15% of factory cost
- Selling and distribution overheads are charged at ₹3 per unit
- Opening stock of finished goods is valued at ₹120 per unit
- The company values work-in-process at factory cost for both Financial and Cost Profit Reporting.

Required:

(a) Prepare a statement for the year ended 31st March, 2018. Show
   - The profit as per financial records
   - The profit as per costing records

(b) Prepare a statement reconciling the profit as per costing records with the profit as per Financial Records.

41. The Trading and Profit and Loss account of a company for the year ended 31-03-2016 is as under: **[Nov 2016]**

	₹		₹
To Material	26,80,000	By Sales (50,000 units)	62,00,000
To Wages	17,80,000	By Closing stock (2000 units)	1,50,000
To Factory Expenses	9,50,000	By Dividend received	20,000
To Administration Expenses	4,80,200		
To Selling Expenses	2,50,000		
To Preliminary Expenses	50,000		
To Net Profit	1,79,800		
	63,70,000		**63,70,000**

In the Cost accounts:

(i) Factory expenses have been allocated to production at 20% of Prime Cost.

(ii) Administrative expenses absorbed at 10% of factory cost

(iii) Selling expenses charged at ₹10 per unit sold.

Prepare the Costing Profit and Loss Account of the company and reconcile the Profit/Loss with the profit as shown in the Financial Accounts.

42 The profit and loss account of ABC Ltd. for the year ended 31st March, 2021 is given below:**[July 2021]**

Profit and Loss Account (for the year ended 31st March, 2021)

To Direct Material	6,50,000	By Sales	15,00,000
To Direct Wages	3,50,000	(15,000 units)	
To Factory overheads	2,60,000	By Dividend received	9,000
To Administrative overheads	1,05,000		
To Selling overheads	85,000		
To loss on sale of investments	2,000		
To Net Profit	57,000		
	15,09,000		**15,09,000**

Factory overheads are 50% fixed and 50% variable

- Administrative overheads are 100% fixed
- Selling overheads are completely variable
- Normal production capacity of ABC Ltd. is 20,000 units
- Indirect expenses are absorbed in the cost accounts on the basis of normal production capacity.
- Notional rent of own premises charged in cost accounts is amounting to ₹12,000.

You are required to:

(i) Prepare a cost sheet and ascertain the Profit as per cost Records for the year ended 31st March, 2021.

(ii) Reconcile the profit as per Financial records with Profit as per Cost Records.

22. **Journal Entries**

	Particular		Dr. (₹)	Cr. (₹)
(i)	WIP Ledger Control A/c	Dr.	5,88,000	
	To Stores Ledger Control A/c			5,88,000
(ii)	Factory Overhead Control A/c	Dr.	7,50,000	
	To Wages Control A/c			7,50,000
(iii)	Factory Overheads Control A/c	Dr.	2,25,000	
	To P&L A/c			2,25,000
(iv)	P&L A/c	Dr.	1,55,000	
	To Administrative Overheads Control A/c			1,55,000
(v)	Factory Overheads Control A/c	Dr.	2,00,000	
	To Stores Ledger Control A/c			2,00,000

23. **Journal Entries**

S.No.	Particular		Dr. (₹)	Cr. (₹)
1.	Finished Goods Ledger Control A/c	Dr.	2,10,835	
	To WIP Control A/c			2,10,835
2.	Manufacturing Overheads Control A/c	Dr.	91,510	
	To cost Ledger Control A/c			91,510
3.	Stores Ledger Control A/c	Dr.	1,23,000	
	To Cost Ledger Control A/c			1,23,000
4.	Wages Control A/c	Dr.	72,195	
	To Cost Ledger Control A/c			72,195
5.	WIP Control A/c	Dr.	50,530	
	To Wages Control A/c			50,530
6.	Manufacturing Overhead Control A/c	Dr.	21,665	
	To Wages Control A/c			21,665
7.	Cost of Sales A/c	Dr.	1,85,890	
	To Finished Stock Ledger A/c			1,85,890
8.	WIP Control A/c	Dr.	1,27,315	
	To Stores Ledger Control A/c			1,27,315
9.	Finished Stock Ledger Control A/c	Dr.	5,380	
	To Cost of Sales A/c			5,380
10.	Cost Ledger Control A/c	Dr.	2,900	
	To Stores Ledger Control A/c			2,900
11.	WIP Control A/c	Dr.	77,200	
	To Manufacturing Overhead Control A/c			77,200

Stores Ledger Control A/c (SLC)			
To Balance b/d	3,01,435	By Work-in-progress Control a/c	1,27,315
To Cost Ledger Control	1,23,000	By Cost Ledger Control a/c	2,900
		By Balance c/d	2,94,220
	4,24,435		**4,24,435**

Wages Control A/c			
To Cost Ledger Control	72,195	By Work-in-progress a/c	50,530
		By Manufacturing Overhead A/c	21,665
	72,195		**72,195**

Manufacturing Overhead Control A/c			
To Cost Ledger Control	91,510	By Balance b/d	10,525
To Wages Control	21,665	By Work-in-progress	77,200
		By Balance c/d	25,450
	1,13,175		**1,13,175**

Work in Progress Control A/c (WIP)			
To Balance b/d	1,22,365	By Finished Goods Ledger Control	2,10,835
To Wages Control	50,530		1,66,575
To Stores Ledger Control	1,27,315	By Balance c/d (B/F)	
To Manufacturing Overhead	77,200		
	3,77,410		**3,77,410**

Finished Stock Ledger Control A/c			
To Balance b/d	2,51,945	By Cost of Sales a/c	1,85,890
To WIP Control a/c	2,10,835	By Balance c/d	2,82,270
To Cost of Sales a/c	5,380		
	4,68,160		**4,68,160**

Cost of Sales A/c			
To Finished Goods Ledger Control	1,85,890	By Finished Stock Ledger Control a/c	5,380
		By Balance c/d	1,80,510
	1,85,890		**1,85,890**

Cost Ledger Control A/c (CLC)			
To Stores Ledger Control a/c	2,900	By Balance b/d	6,65,220
To Balance c/d	9,49,025	By Manufacturing OH Control	91,510
		By Stores Ledger Control	1,23,000
		By Wages Control	72,195
	9,51,925		**9,51,925**

Trial Balance at the End of the Month		
Stores Ledger Control a/c	2,49,220	-
Work in Progress Ledger Control a/c	1,66,575	-
Finished Goods Ledger Control a/c	2,82,270	-
Manufacturing Overheads Control a/c	25,450	-
Cost of Sales a/c	1,80,510	-
Cost Ledger Control a/c	-	9,49,025
Total	**9,49,025**	**9,49,025**

24.

Cost Ledger Control A/c			
To Stores Ledger Control a/c	1,30,000	By Balance b/d	68,50,000
To Cost of Sales a/c	16,60,000	By Manuf. Overhead Control a/c	8,50,000
To Balance c/d (Balance)	77,60,000	By Stores Ledger Control a/c	12,50,000
		By Wages Control a/c	6,00,000
	95,50,000		**95,50,000**

Stores Ledger Control A/c			
To Balance b/d	30,00,000	By Cost Ledger Control a/c	1,30,000
To Cost Ledger Control a/c	12,50,000	By Work in Progress Control a/c	13,50,000
		By Balance c/d (Balance figure)	2,77,000
	42,50,000		**42,50,000**

Work in Progress Control A/c			
To Balance b/d	15,00,000	By Finished Stock Led. Control a/c	22,50,000
To Wages Control a/c	4,00,000	By Balance c/d (Balancing Figure)	18,50,000
To Stores Ledger Control a/c	13,50,000		
To Manuf. O/H Control a/c	8,50,000		
	41,00,000		**41,00,000**

Finished Stock Ledger Control A/c			
To Balance b/d	25,00,000	By Cost of Sales A/c	17,50,000
To Work in Progress Control A/c	22,50,000	By Balance c/d (Bal. Fig.)	30,90,000
To Cost of Sales A/c	90,000		
	48,40,000		**48,40,000**

Manufacturing Overhead Control A/c			
To Cost Ledger Control A/c	8,50,000	By Balance B/d	1,50,000
To Wages Control A/c	2,00,000	By Work in Progress Control A/c	8,50,000
		By Balance c/d (Balancing figure)	50,000
	10,50,000		**10,50,000**

Wages Control A/c			
To Cost Ledger Control A/c	6,00,000	By Work in Progress Control A/c	4,00,000
		By Manuf. Overhead Control A/c	2,00,000
	6,00,000		**6,00,000**

Cost of Sales A/c			
To Finished Stock Led. Cont. A/c	17,50,000	By Finished Stock Led. Cont. A/c	90,000
		By Cost Ledger Control A/c (Bal.)	16,60,000
	17,50,000		**17,50,000**

Trial Balance

Particulars	Debit	Credit
Cost Ledger Control A/c		77,60,000
Stores Ledger Control A/c	27,70,000	
Work in Progress Control A/c	18,50,000	
Finished Stock Ledger Control A/c	30,90,000	
Manufacturing Overhead Control A/c	50,000	
	77,60,000	**77,60,000**

25.

Raw Material Control A/c			
To Balance B/d	2,82,450	By General Ledger Adj. A/c	27,200
To General Ledger Adj. A/c	12,43,810	By Work in Progress Control A/c	13,60,430
			6,000
		By Costing P&L A/c (Loss)	1,32,630
	15,26,260	By Balance c/d (Balance figure)	**15,26,260**

Work in Progress Control A/c			
To Balance b/d	2,38,300	By Finished goods Control A/c	13,76,200
To Raw material control A/c	13,60,430	By Costing P&L A/c	12,300
To Wages control A/c	2,56,800	By Balance c/d (Balancing Figure)	6,03,380
To Factory OH control A/c	1,36,350		
	19,91,880		**19,91,880**

Finished Stock Ledger Control A/c			
To Balance b/d	3,92,500	By Cost of Sales A/c	14,56,500
To Work in Progress Control A/c	13,76,200	By Balance c/d (Bal. Fig.)	3,58,100
To General Ledger Adjustment A/c	45,900		
	18,14,600		**18,14,600**

General Ledger Adjustment A/c			
To Costing P&L (Sales) (Bal. fig.)	25,68,910	By Balance B/d	9,13,250
To Raw material control A/c	27,200	By Raw material control a/c	12,43,810
		By Wages control A/c	2,56,800
		By Factory OH control A/c	1,36,350
		By Finished Goods Control A/c	45,900
	9,55,000		**25,96,110**

26.

Store Ledger Control Account			
To Bal. b/d	8,000	By WIP LC A/c (bal fig.)	22,000
To GLA A/c	25,000	By Bal. c/d	11,000
	33,000		**33,000**

Wages Control Account			
To GLA A/c	10,000	By Fixed overhead control A/c (Bal. fig.)	2,000
		By WIP LC A/c	8,000
	10,000		**10,000**

Fixed Overhead Control Account			
To Wages Control A/c	2,000	By WIP LC A/c	9,000
To GLA A/c	8,000	By Costing P&L A/c (Bal fig.)	1,000
	10,000		**10,000**

WIP LC Account			
To Bal. b/d	5,000	By FG LC A/c (Bal fig.)	35,000
To Store ledger control A/c	22,000		
To Wages Control A/c	8,000	By Bal. c/d	9,000
To Fixed overhead control A/c	9,000		
	44,000		**44,000**

Finished Goods Ledger Control Account			
To Bal. b/d	10,000	By Cost of Sales (Bal fig.)	33,000
To WIP LC A/c	35,000	By Bal. c/d	12,000
	45,000		**45,000**

Cost of Sales Account			
To FG LC A/c	33,000	By Costing P&L A/c	33,000
	33,000		**33,000**

Costing P&L Account			
To Cost of sales A/c	33,000	By GLA A/c	50,000
To Fixed overhead control A/c	1,000		
To GLA A/c (Bal fig.)	16,000		
	50,000		**50,000**

GLA Account			
To Costing P&L A/c [50000–16000]	34,000	By Bal. b/d	23,000
To Bal. c/d (Bal fig.)	32,000	By SLC A/c	25,000
		By Wages Control A/c	10,000
		By Fixed overhead control A/c	8,000
	66,000		**66,000**

27.

Stores Ledger Control Account			
To Balance b/d	15,000	By Work-in-Progress	80,000
To Cost Ledger Adjustment A/c	80,000	By Overhead A/c	10,000
To Work-in-Progress A/c	40,000	By Cost Ledger Control A/c	5,000
		By Overhead A/c (shortage)*	3,000
		By Balance c/d	37,000
	1,35,000		**1,35,000**

*Assumed normal

Wages Control Account			
To Cost Ledger Control A/c	35,000	By WIP Control A/c	30,000
		By Overheads Control A/c	5,000
	10,92,000		**35,000**

Overheads Control Account			
To Stores Ledger Control A/c	10,000	By Work-in-Progress	1,20,000
To Stores Ledger Control A/c	3,000	By Balanced c/d	23,000
To Wages Control A/c	5,000		
To Cost Ledger Control A/c	1,25,000		
	1,43,000		**1,43,000**

Work-in-Progress Control Account			
To Balance b/d	30,000	By Stores Ledger Control A/c	40,000
To Stores Ledger Control A/c	80,000	By Costing Profit & Loss A/c	2,00,000
To Wages Control A/c	30,000	(Finished Goods at Cost	
To Overhead A/c (Applied)	1,20,000	Bal. Fig.)	20,000
	2,60,000	By Balance c/d	**2,60,000**

Costing Profit & Loss Account			
To Work-in-Progress A/c	2,00,000	By General Ledger Adjustment A/c Sale (2,00,000 + 10%)	2,20,000
To General Ledger Adjustment A/c	20,000		
(Profit)	**2,20,000**		**2,20,000**

Financial Profit & Loss Account			
To Material	90,000	By Sales A/c	2,20,000
(op. + Purchase – sale)	30,000	By Closing WIP	20,000
To Opening WIP	35,000	By Closing stock of raw material	37,000
To Wages	1,25,000	By Net loss	3,000
To Overhead expenses			
	2,80,000		**2,80,000**

Reconciliation Statement	
Profit as Per Cost Account	20,000
Less: Under Absorption of Overhead	(23,000)
Loss as per Financial Accounts	
	(3,000)

28. Working Notes:

(a) Overhead recovery rate = $\frac{\text{Budgeted Factory Overheads}}{\text{Budgeted Direct Labour hours}} = \frac{6,75,000}{4,50,000}$ = ₹1.50 per direct labour hour

(b) Direct labour cost WIP (on 31st March) ₹3,000
Direct labour hours of WIP 1,200 hours

Direct wage rate per hour = $\frac{\text{Direct labour cost on WIP}}{\text{Direct Labour hours of WIP}} = \frac{3,000}{1,200}$ = ₹2.50 per hour

(c) Total direct wages charged to production = 28,200 × 2.50 = ₹70,500

(1) Material purchased during March

Payment made to creditors	₹1,05,000
Add: Closing balance in creditors account	₹15,000
	₹1,20,000
Less: Opening balance	₹30,000
Material purchased during March	₹90,000

(2) Cost of Goods completed in March

Cost of goods sold during the month	₹1,95,000
Add: Closing finished goods inventory	₹66,000
	₹2,61,000
Less: Opening finished goods inventory	₹75,000
Cost of goods completed in March	**₹1,86,000**

(3) Overheads applied to production in March = 28,200 × ₹1.50 = ₹42,300

(4) Balance of WIP on 31st March

Direct material cost	₹6,000
Direct labour cost	₹3,000
Overheads (1,200 hours × 1.50)	₹1,800
	₹10,800

(5) Direct material consumed during March

Dr.	Work in Progress Control A/c				Cr.
Date	**Particulars**	**Amount (₹)**	**Date**	**Particulars**	**Amount (₹)**
1.03	To Opening Balance	6,000		By Finished goods	1,86,000
	To Direct wages	70,500	31.3	By Balance of WIP	10,800
	To Factory overheads	42,300			
	To Material Consumed (Bal. Fig.)	78,000			
		1,96,800			**1,96,800**

(6) Balance of Stores Control Account on 31st March

Dr.	Stores Control A/c				Cr.
Date	Particulars	Amount (₹)	Date	Particulars	Amount (₹)
1.03	To Opening Balance	54,000		By WIP Control A/c	78,000
	To Creditors A/c	90,000	31.3	By Balance c/d	66,000
		1,44,000			**1,44,000**

(7) Over-absorbed or Under-absorbed overheads for 31st March

Dr.	Factory Overhead A/c				Cr.
Date	Particulars	Amount (₹)	Date	Particulars	Amount (₹)
	To General Ledger Adj. A/c	45,000	31.3	By Factory overhead applied	42,300
				By Costing P&L A/c	2,700
		45,000		(under absorbed)	1,44,000

29. Reconciliation Statement

Particulars	+ (₹)	– (₹)
Net loss as per costing records		35,400
Less: Administration overhead under-recovered		25,500
Depreciation in under charged		26,000
Obsolescence loss not charged		16,800
Income-tax not provided		43,600
Goodwill written off		25,000
Provision for doubtful debts		15,000
Add: Factory overhead over recovered	1,35,000	
Dividend received	20,000	
Interest received not included	13,600	
Difference in value of Opening stock [1,65,000 – 1,45,000]	20,000	
Difference in value of Closing stock [1,32,000 – 1,25,500]	6,500	
Notional rent of own premises	60,000	
	2,55,100	**1,87,300**
Net profit as per financial records	**67,800**	

30.

Memorandum Reconciliation Account

Particulars	₹	Particulars	₹
To Net loss per costing books	2,25,000	By Administrative overhead over absorber in costs	3,000
To Factory overheads over absorbed	5,000	By Depreciation over charged in cost	10,000
To Income tax not provided in cost	65,000	By Interest on investment	20,000
To Preliminary expenses written off in P&L	3,000	By Transfer fee	2,000
To Over-valuation of closing stock of finished goods	7,000	By Net loss as per financial books	2,70,000
	3,05,000		**3,05,000**

31. Memorandum Reconciliation Account

Particulars	₹	Particulars	₹
To Net loss per costing books	3,47,000	By Administrative overhead over absorber in costs	60,000
To Factory overheads under absorbed	40,000	By Interest on investments	96,000
To Under charged depreciation	50,000	By Transfer fees	24,000
To Income tax provided	54,000	By Stores Adjustment	14,000
To Interest on loan funds	2,45,000	By Dividend Received	32,000
		By Net loss as per financial books	5,10,000
	7,36,000		**2,93,000**

32. **Memorandum Reconciliation Account**

Particulars	₹	Particulars	₹
To Work overheads under recovered	48,600	To Net Profit as per cost books	48,408
To Provision for doubtful debts	17,800	By Office overheads over recovered	11,500
To Obsolescence loss	17,200	By Dividend received on shares	17,475
To Store adjustment (Debit)	35,433	By Interest on fixed deposits	21,650
		By Depreciation over charged	5,000
		By Net loss as per financial accounts	15,000
	1,19,033		**1,19,033**

33. Reconciliation statement

Particulars	+ (₹)	- (₹)
Loss as per cost accounts	-	1,18,500
Add: Over absorbed factory overheads	32,500	-
Less: Under absorbed administration overheads	-	38,250
Add: Over charged depreciation in cost accounts [4,99,700 – 4,55,800]	43,900	-

Less: Loss due to obsolescence	-	11,400
Less: Income tax provision	-	32,650
Add: Interest on investment	96,000	-
Add: Stores adjustment (credit)	12,800	-
Less: Difference in value of opening stock (19,62,500 – 18,85,600)	-	76,900
Add: Difference in value of closing stock (21,98,900 – 21,15,800)	83,100	-
Add: Imputed rent charged in cost accounts	1,80,000	-
Less: Selling & distribution expenses not charged in cost accounts	-	72,450
Less: Donation to Prime Minister Relief Fund	-	11,000
Less: Loss on sale of furniture	-	7,250
Less: Bad debts written off	-	18,300
	4,48,300	**3,86,700**
Profit as per profit & loss account		**61,600**

34. Reconciliation Statement

Particulars	+ (₹)	– (₹)
Loss as per cost accounts	-	2,48,300
Add: Over recovered Works OHs	30,400	-
Less: Under recovered Selling OHs	-	20,300
Less: Under recovered administrative OHs	-	27,700
Add: Depreciation over charged in cost accounts	35,100	-
Less: Bad Debts w/off in financial accounts	-	15,000
Less: Preliminary expenses w/off in financial accounts	-	5,000
Add: Interest credited during the year in financial accounts	7,500	-
	73,000	**3,16,300**
Loss as per financial account	**-**	**2,43,300**

35. Cost Sheet for the Period

	₹
Materials	2,00,000
Labour	1,50,000
Prime Cost	3,50,000
Factory Overhead	90,000
Factory Cost	4,40,000
Office Overhead*	88,000
Cost of Production	5,28,000
Less: Closing Stock (10% of 5,28,000)	52,800
Profit	4,75,200
Sales	44,800
	5,20,000

*It is assumed that administration overheads are related to production.

Profit and Loss Account for the Period

Particulars	₹	Particulars	₹
To Materials	2,00,000	By Sales	5,20,000
To Labour	1,50,000	By Closing Stock (10% of 4,50,000)	45,000
To Factory Expenses	1,00,000		
To Office Expenses	85,000		
To Profit	30,000		
	5,65,000		**5,65,000**

Reconciliation Statement

Particulars		+ (₹)	– (₹)
Profit as per cost Account		44,800	
Add: Over-recovery of office expense in Coat Account		3,000	
Less: Over-valuation of stock in Cost Account	7,800		
Factory overhead under-charged in Cost Account	10,000		17,800
		47,800	**17,800**

36. **Profit & Loss Account**

To Materials	10,00,000	By sales	25,00,000
To Wages	5,00,000	By Closing Stock	1,50,000
To Factory Overheads	4,50,000	By Work-in-Progress	70,000
To Administrative Overheads	2,60,000		
To Selling and Distribution Overheads	1,80,000		
To Interest on Capital	20,000		
To Goodwill Written off	2,00,000		
To Net Profit	1,10,000		
	27,20,000		**27,20,000**

Cost Sheet

Materials	10,00,000
Add: Wages	5,00,000
Prime Cost	15,00,000
Add: Factory overhead @ 100% of wages	5,00,000
Gross Factory Cost	20,00,000
Less: Closing WIP	(70,000)
Net Factory Cost	19,30,000
Add: Administrative overheads @10% of factory cost	1,93,000
Cost of Production (21,230 units)	21,23,000

Less: Closing stock of finished goods (1,230 units)	(1,23,000)
Cost of goods sold	20,00,000
Add: Selling & Dist. Overheads @ ₹10 per unit	2,00,000
Cost of sales (20,000 units)	22,00,000
Add: Profit	3,00,000
Sales	25,00,000

Reconciliation Statement

	Profit as per Cost Records		3,00,000
Add:	Overabsorption of Factory Overheads	50,000	
	Overabsorption of Selling & Distribution Overheads	20,000	
	Undervaluation of Closing Stock of Finished Goods in Cost Account	27,000	97,000
Less:	Under-absorption of Administration Overheads		3,97,000
	Interest on Capital Not Charged in Cost Account	67,000	
	Goodwill Not Written off in Cost Account	20,000	
	Profit as per Financial Records	2,00,000	2,87,000
			1,10,000

37. **Reconciliation statement**

Particulars	+ (₹)	– (₹)
Profit as per profit & loss account	33,248	-
Add: Undervalued closing stock [1,56,394 – 1,50,242]	6,152	-
Less: Over absorbed wages in cost accounts [49,734 – 46,226]	-	3,468
Add: Under absorbed factory overheads [41,652 – 39,428]	2,224	-
Less: Over absorbed administration overheads [(6,93,000×3%) – 19,690]	-	1,100
Add: Under absorbed selling expenses [44,352 - (6,93,000×5%)]	9,702	-
Less: Sundry income not considered in cost accounts	-	632
	51,326	5,200
Profit as per cost accounts	46,126	-

38. Units produced = Units sold + Cl. Stock FG – Op. Stock FG = 30,000 + 2,000 – 0 = 32,000

Costing Profit & Loss Account

Particulars	Amount (₹)	Particulars	Amount (₹)
Material consumed	14,16,000	Sales (30,000 units)	30,00,000
Direct wages	7,42,000		
Prime cost	21,58,000		
Work overheads (20% of prime cost)	4,31,600		
Gross factory cost	25,89,600		
Less: Work-in-progress	(60,000)		

Net Factory cost	25,29,600		
Administration overheads (5×32,000)	1,60,000		
Cost of production	26,89,600		
Less: Finished stock $\left(\frac{26,89,600}{32,000}\times 2,000\right)$	(1,68,100)		
Cost of goods sold	25,21,500		
Selling & distribution overheads (6×30,000)	1,80,000		
Cost of sales	27,01,500		
Profit (Bal. fig.)	2,98,500		
	30,00,000		30,00,000

Reconciliation Statement

Particulars	+ (₹)	- (₹)
Profit as per cost accounts	2,98,500	-
Add: Over recovered work OHs	5,600	-
Less: Over valued closing WIP in cost accounts	-	6,000
Add: Under recovered Administration OHs	10,000	-
Less: Over valued Cl. stock in cost accounts	-	600
Add: Over recovered selling & distribution OHs	15,000	-
	3,29,100	6,600
Profit as per profit & loss account	3,22,500	-

39. (a) Statement of Profit as per Financial Records

Particulars	₹	Particulars	₹
To Direct material	50,00,000	By Sales (1,20,000 units)	1,20,00,000
To Direct wages	30,00,000	By Closing stock	
To Factory Overheads	16,00,000	WIP	2,40,000
To Gross Profit c/d	29,60,000	Finished goods	3,20,000
	1,25,60,000	(4,000 units)	1,25,60,000
To General Administrative overheads	7,00,000	By Gross Profit b/d	29,60,000
To Selling and distribution overheads	9,60,000	By Dividend received	1,00,000
By Bad Debts	80,000	By Interest received	20,000
To Preliminary expenses written off	40,000		
To Legal charges	10,000		
To Profit	12,90,000		
	30,80,000		30,80,000

Units produced = Units sold + Closing stock – opening stock = 1,20,000 + 4000 – 0 = 1,24,000

Statement of Profit as per Costing Records

Particulars	₹
Direct Material	56,00,000
Direct labour	30,00,000
Prime cost	86,00,000
Factory overheads (86,00,000×20%)	17,20,000
Factory cost	1,03,20,000
Less: Closing WIP	(2,40,000)
Cost of Production (1,24,000 units)	1,00,80,000
Less: Closing stock $\left[\frac{10080000}{124000}\times 4000\right]$	(3,25,160)
Cost of goods sold (1,20,000 units)	97,54,840
Administrative overheads (1,20,000 × ₹6)	7,20,000
Selling and distribution overheads (1,20,000 × ₹8)	9,60,000
Cost of sales	1,14,34,840
Profit (Bal. fig.)	5,65,160
Sales	1,20,00,000

(b) Reconciliation Statement

Particulars	+ (₹)	– (₹)
Profit as per cost accounts	5,65,160	-
Add: Excess of material consumption	6,00,000	-
Add: Factory overheads	1,20,000	-
Add: Administrative overheads	20,000	-
Add: Dividend received	1,00,000	-
Add: Interest received	20,000	-
Less: Bad Debts	-	80,000
Less: Preliminary expenses written off	-	40,000
Less: Legal charges	-	10,000
Less: Bad Over-valuation of stock	-	5,160
	14,25,160	1,35,160
Profit as per financial accounts	12,90,000	-

40. (a) Statement of Profit as per Financial Records

Particulars	₹	Particulars	₹
To Opening stock of Finished goods	53,125	By Sales	22,80,000
To work-in-process	46,000	By Closing stock of Finished Goods	45,650
To Raw materials consumed	8,40,000	By Work-in-process	41,200
To Direct labour	6,10,000	By Rent received	46,000
To Factory overheads	4,22,000	By Interest received	38,000

Particulars	₹	Particulars	₹
To Administration overheads	1,98,000		
To Selling & Distribution overheads	72,000		
To Dividends paid	1,22,000		
To Bad Debts	18,000		
To Profit	69,725		
	24,50,850		24,50,850

Units produced = Units sold + Closing stock – opening stock = 12,615 + 415 – 625 = 12,405

Statement of Profit as per Costing Records

Particulars	₹
Raw material consumed	8,40,000
Direct labour	6,10,000
Prime cost	14,50,000
Factory overheads (6,10,000×70%)	4,27,000
Factory cost	18,77,000
Add: Opening WIP	46,000
Less: Closing WIP	(41,200)
Factory cost of goods purchased	18,81,800
Add: Administration overheads (15% × 18,81,800)	2,82,270
Cost of Production	21,64,070
Add: Opening stock (625 × 120)	75,000
Less: Closing stock	(72,397)
Cost of goods sold	21,66,673
Selling and distribution overheads (12,615 × 3)	37,845
Cost of sales	22,04,518
Profit (Bal. fig.)	75,482
Sales	22,80,000

(b) Reconciliation Statement

Particulars	+ (₹)	– (₹)
Profit as per cost accounts	75,482	-
Add: Over absorbed administration overheads	84,270	-
Add: Over valued opening stock of finished goods	21,875	-
Add: Interest received	38,000	-
Add: Rent received	46,000	-
Add: Factory overheads over absorbed	5,000	-
Less: Selling & distribution overheads under recovered	-	34,155
Less: closing stock overvalued	-	26,747
Less: Dividend	-	1,22,000
Less: Bad debts	-	18,000
	2,70,627	**2,00,902**
Profit as per financial accounts	69,725	-

Note – It is assumed that administration overheads are related to production.

41. Costing Profit & Loss Account

Particulars	Amount	Particulars	Amount
To Material	26,80,000	By Prime Cost c/d (B/F)	44,60,000
To Wages	17,80,000		
	44,60,000		44,60,000
To Prime Cost b/d	44,60,000	By Factory Cost c/d (B/F)	53,52,000
To Factory Exp. (44,60,000×20%)	8,92,000		
	53,52,000		**53,52,000**
To Factory Cost b/d	53,52,600	By Cost of Production c/d (B/F)	58,87,200
To Admin. Exp. (10% × 53,52,000)	5,35,200		
	58,87,200		**58,87,200**
To Cost of Production b/d	58,87,200	By Cost of Goods Sold c/d (B/F)	56,60,769
To Opening Finished Goods	-	By Closing Finished Goods $\left[\frac{58,87,200}{52,000}\times 2,000\right]$	2,26,431
	58,87,200		**58,87,200**
To Cost of Goods Sold b/d	56,60,769	By Cost of Sales c/d (B/F)	61,60,769
To Selling Exp. (10 × 50,000)	5,00,000		
	61,60,769		**61,60,769**
To Cost of Sales b/d	61,60,769	By Sales	62,00,000
To Profit	39,231		
	62,00,000		**62,00,000**

Reconciliation Statement

Particulars	+ (₹)	– (₹)
Profit as per cost accounts	39,231	-
Less: Under recovered Factory Expenses	-	58,000
Add: Over recovered Administrative Expenses	55,000	-
Less: Over valued closing stock in cost accounts	-	76,431
Add: Over recovered selling expenses	2,50,000	-
Add: Dividend received	20,000	-
Less: Preliminary expenses	-	50,000
	3,64,231	**1,84,431**
Profit as per financial account	**1,79,800**	-

42. (i) **Cost Sheet**

Particulars		Amount
Raw material consumed		6,50,000
Direct wages		3,50,000
	Prime Cost	10,00,000
Add: Fixed factory overheads $\left(\frac{2,60,000\times 50\%}{20,000}\times 15,000\right)$	97,500	

Add: Variable factory overheads (2,60,000 × 50%)	1,30,000	2,27,500
Add: Notional rent of own premises		12,000
	GFC/NFC/COP/COGS	12,39,500
Add: Administrative overheads $\left(\frac{1,05,000}{20,000}\times 15,000\right)$		78,750
Add: selling & Distribution overheads		85,000
	Cost of Sales	14,03,250
Add: Profit (Balancing figure)		96,750
	Sales	15,00,000

(ii) **Reconciliation Statement**

Particulars	+ (₹)	– (₹)
Profit as per P&L Account	57,000	-
Add: Under recovered factory overheads (2,60,000 – 2,27,500)	32,500	-
Less: Notional rent of own premises	-	12,000
Add: Under recovered administrative overheads (1,05,000 – 78,750)	26,250	-
Add: Loss on sale of investment	2,000	-
Less: Dividend received	-	9,000
Total	**1,17,750**	**21,000**
Profit as per Cost Account	**96,750**	-

❑❑❑

CHAPTER 8

Unit and Batch Costing

Unit Costing	• It is that method of costing where the output produced is identical and each unit of output requires identical cost e.g. paper, cement, mining etc. • It is synonym for single or output costing. • Cost per unit = $\frac{\text{Total cost of production}}{\text{No. of units produced}}$
Batch Costing	• It is that form of specific order costing which applies where similar articles are manufactured in batches either for sale or use within the undertaking. • Each batch of output is a cost unit and is costed separately. • The total batch cost divided by number of units produced in a batch gives cost per unit. • It is generally undertaken in case of pharmaceutical production, shoes, garments, etc.
Features of Batch Costing	• Each batch is a cost unit. • All units produced as part of a batch are identical. • Each batch is to be costed separately. • Each batch generally involves a set up cost. • Set up cost for each batch is more or less same irrespective of size of the batch. • Batch production is generally for stock. • Larger the batch size, longer is the time interval between batches. • The method is used where small parts are produced in significantly large number. • The advantage of the method is that cost and profit per unit can be known without preparing cost sheet for each unit but by determining cost of the batch as a whole and dividing it by number of units constituting the batch.
Economic Batch Quantity	• If production of goods is made in large batches then carrying cost will be high. • If batch size is small, then the setting up cost will be high. • The size of the batch for which both setting up and carrying cost are minimum is known as economic batch quantity • Economic Batch Quantity = $\sqrt{\frac{2 \times A \times S}{C}}$ • A = Annual requirement of the product • S = Setting up cost per batch • C = Carrying cost per unit per annum

<table>
<tr><td>Setting up Costs</td><td>• These are the costs relating to preparation for starting new batch of production, e.g., setting the machines and tools for a particular batch, cleaning the plant and machinery, etc.
• Setting up cost remains constant irrespective of batch size. Therefore, larger the batch size lower is per unit setting up cost and vice versa.</td></tr>
<tr><td>Carrying Costs</td><td>• This includes cost of capital blocked in inventories and storage costs, such as, rent, insurance, pilferage, obsolescence, etc.
• Larger the batch size, larger will be the average inventory held and therefore larger will be the total carrying cost for the year, and vice versa.</td></tr>
<tr><td>Difference between Job Costing and Batch Costing</td><td>
<table>
<tr><th>Basis</th><th>Job Costing</th><th>Batch Costing</th></tr>
<tr><td>Nature</td><td>It is a specific order costing.</td><td>It is a special type of job costing.</td></tr>
<tr><td>Applicability</td><td>It is undertaken in industries where work is done as per the customer's requirement.</td><td>It is undertaken in industries where production is of repetitive nature.</td></tr>
<tr><td>Similarity</td><td>No two jobs are alike.</td><td>Articles produced in a batch are alike.</td></tr>
<tr><td>Cost determination</td><td>The cost is determined on job basis.</td><td>The cost is determined on batch basis.</td></tr>
<tr><td>Output quantity</td><td>The output of a job may be 1 unit, 2 units.</td><td>The output of a batch is usually a large quantity.</td></tr>
<tr><td>Cost estimation</td><td>The cost is estimated before the production.</td><td>The cost is determined after completion of production.</td></tr>
<tr><td>Examples</td><td>Repair workshop, furniture, general engineering works etc.</td><td>Pharmaceuticals, garments, radio, TV manufacturing etc.</td></tr>
</table>
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PRACTICE QUESTIONS

1. SK LTd. produced a uniform type of product and has a manufacturing capacity of 3,000 units per week of 48 hours. From the records of the company, the following data are available relating to output and cost of 3 consecutive weeks: **[SM]**

Week Number	Units Manufactured	Direct Material (₹)	Direct Wages (₹)	Factory Overheads (₹)
1	1,200	9,000	3,600	31,000
2	1,600	12,000	4,800	33,000
3	1,800	13,500	5,400	34,000

Assuming that the company charges a profit of 20% on selling price, find out the selling price per unit when the weekly output is 2,000 units.

Ans. ₹35.

2. **[SM]**

Monthly demand for a product	500 units
Setting-up cost per batch	₹60
Cost of manufacturing per unit	₹20
Rate of interest	10%

Determine economic batch quantity.

Ans. 600 units.

3. XYZ Ltd. has obtained an order to supply 48,000 bearings per year from a concern. On a steady basis, it is estimated that it costs ₹0.20 as inventory holding cost per bearing per month and the set-up cost per run of bearing manufacture is ₹384. **[SM, Nov 2018]**

You are required to:

(i) Compute the optimum run size and number of runs for bearing manufacture.

(ii) Compute the interval between two consecutive runs

(iii) Find out the extra costs to be incurred, if company adopts a policy to manufacture 8,000 bearings per run as compared to optimum run size

(iv) Give your opinion regarding run size of bearing manufacture.

Assume 365 days in a year.

Ans. (i) 3,920; 13; (ii) 28.07 days; (iii) ₹2,208; (iv) batch size 3,920.

4. A company has an annual demand from a single customer for 50,000 litres of a paint product. The total demand can be made up of a range of colour to be produced in a continuous production run after which a set-up of the machinery will be required to accommodate the colour change. The total output of each colour will be stored and then delivered to the customer as single load immediately before production of the next colour commences. **[SM]**

The set up costs are ₹100 per set up. The service is supplied by an outside company as required. The Holding costs are incurred on rented storage space which costs ₹50 per sq. meter per annum. Each square meter can hold 250 litres suitably stacked.

You are required to:

(i) Calculate the total cost per year where batches may range from 4,000 to 10,000 litres in multiples of 1,000 litres and hence choose the production batch size which will minimize cost.

(ii) Use the economic batch size formula to calculate the batch size which will minimize total cost.

Ans. (i) ₹1,650; ₹1,500; ₹1,433; ₹1,414; ₹1,425; ₹1,456; ₹1,500; 7,000 litres; (ii) 7,071 litres.

5. Arnav Confectioners (AC) owns a bakery which is used to make bakery items like pastries, cakes and muffins. AC use to bake at least 50 units of any item at a time. A customer has given an order for 600 cakes. To process a batch, the following cost would be incurred: **[SM, RTP May 2018]**

Direct materials - ₹5,000

Direct wages - ₹500 (irrespective of units)

Oven set-up cost - ₹750 (irrespective of units)

AC absorbs production overheads at a rate of 20% of direct wages cost. 10% is added to the total production cost of each batch to allows for selling, distribution and administration overheads. AC requires a profit margin of 25% of sales value.

Required:

(a) Determine the price to be charged for 600 cakes

(b) Calculate cost and selling price per cake

(c) Determine what would be selling price per unit if the order is for 605 cakes.

Ans. (a) ₹1,11,760; (b) ₹186.27; (c) ₹189.21.

6. SK Ltd. undertakes to supply 1,000 units of a component per month for the month of January, February and March. Every month a batch order is opened against which materials and labour costs are booked at actual. Overheads are levied on the basis of labour hours. The selling price is contracted at ₹15 per unit.

From the following data, present the cost and profit per unit of each batch order and the overall position of the order for 3,000 units. Ignore set up costs.

	Batch Output	Material Cost	Labour Cost
Months	**(Number)**	₹	₹
January	1,250	6,250	5,000
February	1,500	9,000	6,000
March	1,000	5,000	4,000

Labour is paid at the rate of ₹4 per hour. The other details are:

Months	**Overhead (₹)**	**Total Labour Hours**
January	12,000	4,000
February	9,000	4,500
March	15,000	5,000

Ans. Cost per unit = ₹12; ₹12; ₹12.

7. A jobbing factory has undertaken to supply 200 pieces of a component per month for the ensuing six months. Every month a batch order is opened against which materials and labour hours are booked at actual. Overheads are levied at a rate equal to per labour hour. The selling price contracted for is ₹8 per piece. From the following data calculate the cost and profit per piece of each batch order and overall position of the order for 1,200 pieces. **[SM]**

Month	Budgeted Output	Material cost (₹)	Direct Wages (₹)	Direct Labour Hours
January	210	650	120	240
February	200	640	140	280
March	220	680	150	280

Month	Budgeted Output	Material cost (₹)	Direct Wages (₹)	Direct Labour Hours
April	180	630	140	270
May	200	700	150	300
June	220	720	160	320

The other details are:

Month	Overheads (₹)	Direct Labour Hours
January	12,000	4,800
February	10,560	4,400
March	12,000	5,000
April	10,580	4,600
May	13,000	5,000
June	12,000	4,800

Ans. Cost per unit = ₹6.52; ₹7.26; ₹6.83; ₹7.73; ₹8.15; ₹7.64;₹7.34.

8. Arnav Ltd. operates in beverages industry where it manufactures soft- drink in three sizes of Large (3 litres), Medium (1.5 litres) and Small (600 ml) bottles. The products are processed in batches. The 5,000 litres capacity processing plant consumes electricity of 90 Kilowatts per hour and a batch takes 1 hour 45 minutes to complete. Only symmetric size of products can be processed at a time. The machine set-up takes 15 minutes to get ready for next batch processing. During the set-up power consumption is only 20%. **[RTP May 2024]**

(i) The current price of Large, Medium and Small are ₹150, ₹90 and ₹50 respectively.

(ii) To produce a litre of beverage, 14 litres of raw material-W and 25 ml of Material-C are required which costs ₹0.50 and ₹1,000 per litre respectively.

(iii) 20 direct workers are required. The workers are paid ₹880 for 8 hours shift of work.

(iv) The average packing cost per bottle is ₹3

(v) Power cost is ₹7 per Kilowatt -hour (Kwh)

(vi) Other variable cost is ₹30,000 per batch.

(vii) Fixed cost (Administration and marketing) is ₹4,90,00,000.

(vii) The holding cost is ₹1 per bottle per annum.

The marketing team has surveyed the following demand (bottle) of the product:

Large	Medium	Small
3,00,000	7,50,000	20,00,000

You are required to CALCULATE profit/ loss per batch and also COMPUTE Economic

Batch Quantity (EBQ). **[RTP May 2024]**

Ans. ₹89,03,880; ₹2,12,41,650; ₹4,70,71,840; EBQ = 1,34,234; 2,12,243; 3,46,592]

9. PS Ltd. manufactures articles in predetermined lots simultaneously. The following costs have been incurred for Batch No. 'PS143' in the month of March, 2022: **[RTP Nov 2022]**

Units produced	1,000 units
Direct material costs	₹2,00,000
Direct Labour -	
Department A	800 labour hours @ ₹100 per hour
Department B	1,400 labour hours @ ₹120 per hour

Factory overheads are absorbed on labour hour basis and the rates are:

Department A	@₹140 per hour
Department B	@₹80 per hour

Administrative overheads are absorbed at 10% of selling price

The firm expects 25% gross profit (sales value minus factory cost) for determining the selling price. You are required to calculate the selling price per unit of Batch No. 'PS143'.

Ans. ₹896.

PRACTICE QUESTIONS

10. The following data related to the manufacture of a standard product during the 4-week ended 28th February: **[SM]**

Raw material consumed		₹4,00,000
Direct wages		₹2,40,000
Machine hours worked		3,200 hours
Machine hours rate		₹40
Office overheads	10% of work cost	
Selling overheads	₹20 per unit	

Units produced and sold10,000 at ₹120 each

You are required to find out the cost per unit and profit for the 4-week ended 28th February.

Ans. ₹104.48; ₹15.52.

11. M/s KBC Bearings Ltd. is committed to supply 48,000 bearings per annum to M/s KMR Fans Ltd. on a steady basis. It is estimated that it costs ₹1 as inventory holding cost per bearing per month and that the set up cost per run of bearing manufacture is ₹3,200. **[SM]**

(a) Determine the optimum run size for bearing manufacture?

(b) State what would be the interval between two consecutive optimum runs?

(c) Find out the minimum inventory holding cost?

Ans. (a) 5,060 units; (b) 36.5 days; (c) ₹30,360.

12. A customer has been ordering 90,000 special design metal columns at the rate of 18,000 columns per order during the past years. The production cost comprises ₹2,120 for material, ₹60 for labour and ₹20 for fixed overheads. It costs ₹1,500 to set up for one run of 18,000 column and inventory carrying costs is 5%. **[SM]**

(i) Find the most economic production run

(ii) Calculate the extra cost that company incur due to processing of 18,000 columns in a batch.

Ans. (i) 1,567 units; (ii) ₹8,24,315.

13. AUX ltd. has an annual demand from a single customer for 60,000 Covid-19 Vaccines. The customer prefers to order in the lot of 15,000 vaccines per order. The production cost of vaccine is ₹5,000 per vaccine. The set-up cost per production run of Covid-19 vaccines is ₹4,800. The carrying cost is ₹12 per vaccine per month. **[July 2021]**

You are required to:

(i) Find the most Economical Production Run

(ii) Calculate the extra cost that company incurs due to production of 15,000 vaccines in a batch.

Ans. (i) 2,000 vaccines; (ii) ₹8,11,200.

14. A customer has been ordering 80,000 caps during the year. It is estimated that it costs ₹1 as inventory holding cost per cap per month and that the set up cost per run of cap manufacture is ₹3,500. What is optimum run size of cap manufacture? **[MTP May 2024]**

(a) 12 runs (b) 10 runs (c) 15 runs (d) 7 runs

Ans. (a)

SOLUTION OF PRACTICE QUESTIONS

10. **Statement of Cost**

Particulars	Cost per unit (₹)	Amount (₹)
Raw material consumed	40.00	4,00,000
Direct wages	24.00	2,40,000
Prime cost	64.00	6,40,000
Add: Manufacturing overheads (3,200 hours × ₹40)	12.80	1,28,000
Works cost	76.80	7,68,000
Add: Office overheads (10% of works cost)	7.68	76,800

Cost of goods sold	84.48	8,44,800
Add: Selling overheads (10,000 units × ₹20)	20.00	2,00,000
Cost of sales / Total cost	104.48	10,44,800
Add: Profit (Bal. Fig.)	15.52	1,55,200
Sales	120.00	12,00,000

11. (a) Economic batch quantity = $\sqrt{\frac{2\times A\times S}{C}} = \sqrt{\frac{2\times 48,000\times 3,200}{12}}$ = 5,060 units

(b) Number of optimum runs = 48,000 ÷ 5,060 = 9.49 or 10 run

Interval between 2 runs (in days) = 365 ÷ 10 = 36.5 days

(c) Minimum inventory cost = Average inventory × Carrying cost per unit per annum

$$= \left(\frac{5,060}{2}\right) \times 12 = ₹30,360$$

12. (a) Economic batch quantity = $\sqrt{\frac{2\times A\times S}{C}} = \sqrt{\frac{2\times 90,000\times 1,500}{5\%\times 2,200}}$ = 1,567 columns

(b) No. of set up when run size is 1,567 = 90,000 ÷ 1,567 = 57.43 or 58

No. of set up when run size is 18,000 = 90,000 ÷ 18,000 = 5

Total cost at economic batch quantity level = Set-up cost + Carrying cost

$$= [58\times 1,500] + \left[\left(\frac{1,567}{2}\right)\times 5\%\times 2,200\right] = ₹1,73,185$$

Total cost at level of 18,000 columns per run = Set-up cost + Carrying cost

$$= [5\times 1,500] + \left[\left(\frac{18,000}{2}\right)\times 5\%\times 2,200\right] = ₹9,00,000$$

Extra cost to be incurred by the company = ₹9,90,000 – ₹1,73,185 = ₹8,24,315

13. (i) Annual demand = A = 60,000 vaccines

Set-up cost per run = S = ₹4,800

Carrying cost per unit per annum = C = ₹12 × 12 = ₹144

Economic Batch Quantity = $\sqrt{\frac{2\times A\times S}{C}} = \sqrt{\frac{2\times 60,000\times 4,800}{144}}$ = 2,000 vaccines

(ii) **Statement of Cost**

Particulars	Batch size = 2,000 vaccines	Batch size = 15,000 vaccines
Set-up cost	$\frac{60,000}{2,000} \times 4,800 = 1,44,000$	$\frac{60,000}{15,000} \times 4,800 = 19,200$
Carrying cost	$\frac{2,000}{2} \times 144 = 1,44,000$	$\frac{15,000}{2} \times 144 = 10,80,000$
Total Cost	2,88,000	10,99,200

Extra cost = ₹10,99,200 – ₹2,88,000 = ₹8,11,200

14. EBQ = $\sqrt{\frac{2 \times 80,000 \times 3,500}{12}}$ = 6,832 units

Number of optimum runs = 80,000 ÷ 6,832 = 11.70 or 12 run

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CHAPTER 9

Job Costing

<table>
<tr><td>Job Costing</td><td>

It is that form of specific order costing under which each job is treated as a cost unit and costs are accumulated and ascertained separately for each job.
In other words, it is that form of specific order costing which applies where work is undertaken according to customer's requirement.
It is generally used in industries where production is not on continuous basis, rather it is only when order from customers are received according to their specifications e.g. printing press, repair shop, etc.
In this method cost of each job is computed by preparing the Job Cost Sheet.

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<tr><td>Features of Job Costing</td><td>

Each job is separately identifiable and has its own special characteristics.
Each job is a separate cost unit and each job needs to be costed separately.
Flow of production from process to process or department to department differs from job to job.
Each job is assigned a specific job order number.
Distinctiveness of each job remains maintained throughout from its commencement to completion.
Jobs are generally costed after the completion of jobs.
Whenever required, estimated job cost sheet can be prepared before commencement of jobs for submitting renders for the jobs.

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<tr><td>Difference between Job Costing and Process Costing</td><td>
<table>
<tr><th>Basis</th><th>Job Costing</th><th>Process Costing</th></tr>
<tr><td>Method</td><td>It is used to ascertain cost of each job.</td><td>It is used to ascertain cost of a product at each process or stage of manufacture.</td></tr>
<tr><td>Cost determination</td><td>Cost is determined separately for each job.</td><td>Cost of a product is determined by accumulating cost of each process.</td></tr>
<tr><td>End product</td><td>The end product of one job is the finished product itself.</td><td>The output of a process becomes the input for the next process.</td></tr>
<tr><td>Cost collection</td><td>The cost is collected on the basis of job order.</td><td>The cost is collected by period i.e. on time basis.</td></tr>
<tr><td>Cost estimation</td><td>Cost is computed or estimated before the production.</td><td>Costs are computed for each process at the end of each period.</td></tr>
<tr><td>WIP</td><td>There may or may not be work in progress at the end.</td><td>There is generally some WIP at the beginning as well as end.</td></tr>
<tr><td>Supervision</td><td>Detailed supervision and control is needed.</td><td>Supervision and control is comparatively easier.</td></tr>
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PRACTICE QUESTIONS

1. The manufacturing cost of a work order is ₹1,00,000; 8% of the production against that order spoiled and the rejection is estimated to have a realizable value of ₹2,000 only. The normal rate of spoilage is 2%. Record this in the costing journal. **[SM]**

2. The following data presented by the supervisor of a factory for a Job. **[SM, Nov 2019]**

	₹ per unit
Direct material	120
Direct wages @ ₹4 per hour	60
(Department A-4 hrs., B-7hrs, C-2hrs & D-2hrs)	
Chargeable Expenses	20
Total	200

Analysis of the Profit and Loss Account for the year ended 31st March 2019

		₹		₹
Material used		2,00,000	Sales	4,30,000
Direct Wages:				
Dept. A	12,000			
Dept. B	8,000			
Dept. C	10,000			
Dept. D	20,000	50,000		
Special Stores Items		6,000		
Overheads:				
Dept. A	12,000			
Dept. B	6,000			
Dept. C	9,000			
Dept. D	17,000	44,000		
Gross Profit c/d		1,30,000		
		4,30,000		4,30,000
Selling Expenses	90,000		Gross Profit b/d	1,30,000
Net Profit	40,000			
	1,30,000			1,30,000

It is also to be noted that average hourly rates for all the four departments are similar. Required:

(i) Prepare a Job Cost Sheet

(ii) Calculate the entire revised cost using the above figures as the base.

(iii) Add 20% profit on selling price to determine the selling price.

3. In a factory following the Job Costing Method, an abstract from the work-in-progress as at 30th June was prepared as under: **[SM]**

Job No.	Materials ₹	Direct Labour Hours	Labour ₹	Factory overheads applied
115	1,325	400 hrs	800	640
118	810	250 hrs	500	400
120	765	237.5 hrs	475	380
	₹2,900		₹1,775	₹1,420

Materials used in July were as follows:

Material requisition no.	Job No.	Cost (₹)
54	118	300
55	118	425
56	118	515
57	120	665
58	121	910
59	124	720
	3,535	

A summary of labour hours deployed during July is as under:

Job No.	Number of hours	
	Shop A	Shop B
115	25	25
118	90	30
120	75	10
121	65	--
124	20	10
275	75	
Indirect labour: Waiting for material	20	10
Machine Breakdown	10	5
Idle Time	5	6
Overtime Premium	6	5
	316	101

A shop credit slip was issued in July that material issued under Requisition No. 54 was returned back to stores as being not suitable. A material transfer note issued in July indicated that material issued under Requisition No. 55 for Job 118 was directed to Job 124.

The hourly rate in shop A per labour hour is ₹3 per hour while at shop B, it is ₹2 per hour. The factory overhead is supplied at the same rate as in June. Job 115, 118 and 120 were completed in July.

You are asked to compute the factory cost of the completed jobs. It is the practice of the management to put a 10% on the factory cost to cover administration and selling overheads and invoice the job to the customer on a total cost plus 20% basis. What would be the invoice price of these jobs?

Ans. Invoice price = ₹3,946.80; ₹3,721.08; ₹3,598.32.

4. APFL Ltd. deals in plumbing materials and also provides plumbing services to its customers. On 12th August, 2022, APFL Ltd. received a job order for a students' hostel to supply and fitting of plumbing materials. The work is to be done on the basis of specification provided by the hostel owner. Hostel will be inaugurated on 5th September, 2022 and the work is to be completed by 3rd September, 2022. Following are the details related with the job work: **[SM, MTP Nov 2019]**

Direct Materials

APFL Ltd. uses weighted average method for the pricing of materials issues.

Opening stock of materials as on 12th August 2022:

- 15mm GI Pipe, 12 units of (15 feet size) @ ₹600 each
- 20mm GI Pipe, 10 units of (15 feet size) @ ₹660 each
- Other fitting materials, 60 units @ ₹26 each
- Stainless Steel Faucet, 6 units @ ₹204 each
- Valve, 8 units @ ₹404 each

Purchases:

On 16th August 2022:

- 20mm GI Pipe, 30 units of (15 feet size) @ ₹610 each
- 10 units of Valve @ ₹402 each

On 18th August 2022:

- Other fitting materials, 150 units @ ₹28 each
- Stainless Steel Faucet, 15 units @ ₹209 each

On 27th August 2022:

- 15mm GI Pipe, 35 units of (15 feet size) @ ₹628 each
- 20mm GI Pipe, 20 units of (15 feet size) @ ₹660 each
- Valve, 14 units @ ₹424 each

Issues for the hostel job:

On 12th August 2022:

- 20mm GI Pipe, 2 units of (15 feet size)
- Other fitting materials, 18 units

On 17th August 2022:

- 15mm GI Pipe, 8 units of (15 feet size)
- Other fitting materials, 30 units

On 28th August 2022:

- 20mm GI Pipe, 2 units of (15 feet size)
- 15mm GI Pipe, 10 units of (15 feet size)
- Other fitting materials, 34 units
- Valve, 6 units

On 30th August 2022:

- Other fitting materials, 60 units
- Stainless Steel Faucet, 15 units

Direct Labour:

Plumber: 180 hours @ ₹50 per hour (includes 12 hours overtime)

Helper: 192 hours @ ₹35 per hour (includes 24 hours overtime)

Overtimes are paid at 1.5 times of the normal wage rate.

Overheads:

Overheads are applied @ ₹13 per labour hour.

Pricing policy:

It is company's policy to price all orders based on achieving a profit margin of 25% on sales price.

You are required to

(a) Calculate the total cost of the job.

(b) Calculate the price to be charged from the customer

Ans. (a) ₹44,367.95; (b) ₹59,157.27.

5. Ispat Engineers Limited (IEL) undertook a plant manufacturing work for a client. It will charge a profit mark up of 20% on the full cost of the jobs. The following are the information related to the job: **[SM, RTP Nov 2019]**

Direct materials utilized – ₹1,87,00,000

Direct labour utilized – 2,400 hours at ₹80 per hour

Budgeted production overheads are ₹48,00,000 for the period and are recovered on the basis of 24,000 labour hours.

Budgeted selling and administration overheads are ₹18,00,000 for the period and recovered on the basis of total budgeted total production cost of ₹36,00,00,000.

Required to calculate the price to be charged for the job.

Ans. ₹2,33,62,632.

PRACTICE QUESTIONS

6. A factory uses job costing system. The following data are obtained from its books for the year ended 31st March, 2020: **[RTP May 2020]**

	Amount (₹)
Direct materials	18,00,000
Direct wages	15,00,000
Selling and distribution overheads	10,50,000
Administration overheads	8,40,000
Factory overheads	9,00,000
Profit	12,18,000

(i) PREPARE a Job Cost sheet indicating the Prime Cost, Cost of Production, Cost of sales and the Sales value.

(ii) In 2019-20, the factory received an order for a job. It is estimated that direct materials required will be ₹4,80,000 and direct labour will cost ₹3,00,000. DETERMINE what should be the price for the job if factory intends to earn the same rate of profit on sales assuming that the selling and distribution overheads have gone up by 15%. The factory overheads is recovered as percentage of wages paid, whereas, other overheads as a percentage of cost of production, based on cost of rates prevailing in the previous year.

Ans. (i) Sales = ₹73,08,000; (ii) Sales = ₹17,13,600.

7. A company has been asked to quote for a job. The company aims to make a net profit of 30% on sales. The estimated cost for the job is as follows: **[RTP Nov 2018]**

Direct materials 10 kg @ ₹10 per kg

Direct labour 20 hours @ ₹5 per hour

Variable production overheads are recovered at the rate of ₹2 per labour hour.

Fixed production overheads for the company are budgeted to be ₹1,00,000 each year and are recovered on the basis of labour hours.

There are 10,000 budgeted labour hours each year. Other costs in relation to selling, distribution and administration are recovered at the rate of ₹50 per job.

Determine quote for the job by the company.

Ans. ₹700.

8. SM Motors Ltd. is a manufacturer of auto components. Following are the details of expenses for the year 2022-23: **[RTP Nov 2023]**

		(₹)
(i)	Opening stock of material	15,00,000
(ii)	Closing stock of material	20,00,000
(iii)	Purchase of material	1,80,50,000
(iv)	Direct labour	90,50,000
(v)	Factory overheads	30,80,000
(vi)	Administrative overhead	20,50,400

During the FY 2023-24, the company has received an order from a car manufacturer where it estimates that the cost of material and labour will be ₹80,00,000 and ₹40,50,000 respectively. The company charges factory overhead as a percentage of direct labour and administrative overheads as a percentage of factory cost based on previous year's cost.

Cost of delivery of the components at customer's premises is estimated at ₹4,50,000. You are required to:

(i) Calculate the overhead recovery rates based on actual costs for 2022-23.

(ii) Prepare a Job cost sheet for the order received and the price to be quoted if the desired profit is 25% on sales.

Ans. (i) 34% of Direct Labour; 6.91% of Factory cost; (ii) 1,97,39,741]

9. The following are the budgeted details available from the records of a manufacturing company SP Ltd: **[MTP May 2024]**

	₹	₹
Direct materials		2,13,000
Direct wages:		
Machine shop (12,000 hours)	63,000	
Assembly shop (10,000 hours)	48,000	1,11,000
Work Overhead:		
Machine shop	88,200	
Assembly shop	51,800	1,40,000
Administrative Overhead		92,800
Selling Overhead		81,000
Distribution Overhead		62,100

You are required to:

(a) Prepare a schedule of Overhead rates from the figures available stating the basis of overhead recovery rates used under the given circumstances.

(b) Work out a cost estimate for the following job based on overhead calculated on above basis.

Direct material	25 kg @ ₹17.20/kg
	15 kg @ ₹21.00/kg
Direct labour (On the basis of hourly rate)	Machine shop 30 hours
(For machine shop and assembly shop)	Assembly shop 42 hours

Ans. (a) ₹7.35 per hour; ₹5.18 per hour; 20% of work cost; 30.84% of work cost; (b) ₹2,326.19

SOLUTION OF PRACTICE QUESTIONS

6.

Statement of Cost and Profit

Particulars	**Amount (₹)**
Direct material	18,00,000
Add: Direct wages	15,00,000
Prime cost	33,00,000
Add: Factory overhead	9,00,000
GFC/NFC/COP/COGS	42,00,000
Add: Administration overhead	8,40,000
Add: Selling overhead	10,50,000
Cost of Sales	60,90,000
Add: Profit	12,18,000

Sales		73,08,000

Calculation of Recovery Rates

Factory overheads as % of direct wages = $\frac{9,00,000}{15,,00000} \times 100$ = 60% of direct wags

Administration overheads as % of NFC = $\frac{8,40,000}{42,00,000} \times 100$ = 20% of NFC

Selling overheads as % of NFC = $\frac{(10,50,000 + 15\%)}{42,00,000} \times 100$ = 28.75% of NFC

Profit as % of Cost of sales = $\frac{12,18,000}{60,90,000} \times 100$ = 20% of Cost of sales

Statement of calculation of selling price of Job

Particulars		**Amount (₹)**
Direct Material		4,80,000
Direct wages		3,00,000
Prime Cost		7,80,000
Add: Factory overheads	(60% × 3,00,000)	1,80,000
GFC/NFC/COP/COGS		9,60,000
Add: Administration overheads	(20% × 9,60,000)	1,92,000
Add: Selling overheads	(28.75% × 9,60,000)	2,76,000
Cost of sales		14,28,000
Add: Profit	(20% × 14,28,000)	2,85,600
Sales		17,13,600

7.

Determination of quotation price for the job

Particulars	₹
Direct material (10 kg × ₹10)	100
Direct labour (20 hours × ₹5)	100
Prime cost	200
Variable production overhead (20 hrs. × ₹2)	40
Fixed overhead	200
Other costs	50
Total cost	490
Profit	210
Sales value (490 ÷ 70%)	700

8. Working Note: Calculation of Factory cost in 2022-23

Particulars	**Amount (₹)**
Opening stock of material	15,00,000
Add: Purchase of material	1,80,50,000
Less: Closing stock of material	(20,00,000)
Material consumed	1,75,50,000
Direct labour	90,50,000
Prime Cost	2,66,00,000
Add: Factory overheads	30,80,000
Factory Cost	2,96,90,000

(i) Calculation of Overhead Recovery Rate:

Factory Overhead Recovery Rate = $\frac{30,80,000}{90,50,000} \times 100$ = 34% of Direct labour

Administrative Overhead Recovery Rate = $\frac{20,50,400}{2,96,80,000} \times 100$ = 6.91% of Factory Overheads

(ii) Job Cost Sheet for the order

Particulars	**Amount (₹)**
Material	80,00,000
Labour	40,50,000
Prime cost	1,20,50,000
Factory overheads (40,50,000 × 34%)	13,77,000
Factory Cost	1,34,27,000
Administrative overheads (1,34,27,000 6.91%)	9,27,806
Cost of delivery	4,50,000
Total cost	1,48,04,806
Profit (1,97,39741 × 25%)	49,34,935
Sales (1,48,04,806 ÷ 75%)	1,97,39741

9. (a) Job Cost Sheet for the period

Particulars	**Amount (₹)**
Direct materials	2,13,000
Direct wages:	
Machine shop 63,000	
Assembly shop 48,000	1,11,000
Prime cost	3,24,000
Work overheads:	
Machine shop 88,200	

Assembly shop 51,800	1,40,000
Work cost	4,64,000
Administration overheads	92,800
Cost of production	5,56,800
Selling overhead	81,000
Distribution overhead	62,100
Total cost	6,99,900

Work overhead hourly rate = Overheads ÷ Hours

Machine shop = 88,200 ÷ 12,000 = ₹7.35 per hour

Assembly shop = 51,800 ÷ 10,000 = ₹5.18 per hour

Administrative overhead as a % of work cost = $\frac{92,800}{4,64,000} \times 100 = 20\%$

Selling & Distribution overhead as % of work cost = $\frac{81,000 + 62,100}{4,64,000} \times 100 = 30.84\%$

Labour hour rates are calculated as under:

Machine shop = 63,000 ÷ 12,000 = ₹5.25

Assembly shop = 48,000 ÷ 10,000 = ₹4.80

(b) Cost estimate for Job

Particulars		**Amount (₹)**
Direct materials		
25 kg @ ₹17.20	430.00	
15 kg @ ₹21	315.00	745.00
Direct wages:		
Machine shop (30 hrs. × ₹5.25)	157.50	
Assembly shop (42 hrs. × ₹4.80)	201.60	359.10
Prime cost		1,104.10
Work overheads:		
Machine shop (30 hrs. × ₹7.35)	220.50	
Assembly shop (42 hrs. × ₹5.18)	217.56	438.06
Work cost		1,542.16
Administration overheads (20 % × 1542.16)		308.43
Cost of production		1,805.59
Selling & Distribution overhead (30.84% × 1542.16)		475.60
Total cost		2,326.19

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10 CHAPTER

Process Costing

Process Costing	• This method is used ascertain cost of a product at each process or stage of manufacture. • It is applied in case of industries where products are manufactured in stages, i.e. output of one process becomes the input of the subsequent process. • Costs are computed by preparing a process account for each process separately.
Normal Wastage	• It is the loss of material which is inherent in the nature of work and is unavoidable. • Such wastage can be estimated in advance on the basis of past experience or technical specifications. • The cost of normal wastage is absorbed by good production units of the process and the cost per unit of good production is increased accordingly. • It can be of three varieties: ➢ Normal loss in nature of weight loss ➢ Normal loss having some realizable value ➢ Normal loss requiring disposal cost to be incurred • Normal cost per unit $= \frac{\text{Total Cost} - \text{Scrap Value of Normal Loss (if any)}}{\text{Total Units} - \text{Normal Loss Units}}$
Abnormal Wastage	• It is a loss which is over and above the normal loss. • It is avoidable in nature and is not inherent in the manufacturing operations. • It may occur due to carelessness of workers, bad plant, design, etc. • The units of abnormal wastage are valued at normal cost per unit and debited to the separate account which is known as abnormal wastage account. • If the abnormal loss fetches some value, the same is credited to abnormal wastage account. • The balance of abnormal loss account is transferred to Costing P&L Account.

Abnormal Gain	• These are the units of goods produced over and above the normal output. • These are valued at normal cost per unit and credited to the abnormal gain account. • The loss of scrap of normal loss due to being converted into abnormal gain units of such products is debited to abnormal gain account. • The balance of abnormal gain account is transferred to Costing P&L Account.
Operation Costing	• It is refinement of process costing and is concerned with the determination of cost of each operation. • It is used in those industries where a process consist of distinct operations. • It offers better control and facilitates, the computation of unit operation cost at the end of each operation.
Equivalent Units	• It represents the incomplete production units expressed in terms of equivalent completed units. • It is calculated as follows: ➢ Compute the number of physical units of closing work in progress ➢ Estimate the percentage of completion of work in progress for various elements of cost viz. materials, labour and overheads ➢ Compute equivalent completed units = Physical units × Percentage of completion
Inter-Process Profit	• In some process the output of one process is transferred to the next not at cost but at market value or cost plus a percentage of profit and the difference between cost and the transfer price is known as inter-process profits. • **Advantages** ➢ Comparison between the cost and market price at the stage of completion is facilitated. ➢ Each process is made to stand by itself as to the profitability. • **Disadvantages** ➢ The use of inter-process profits involve complications. ➢ The system shows profits which are not realized because of stock not sold out.

PRACTICAL QUESTIONS

1. From the following data, prepare process accounts indicating the cost of each process and the total cost. The total units that pass through each process were 240 for the period. **[SM]**

	Process 1 (₹)	Process 2 (₹)	Process 3 (₹)
Material	1,50,000	50,000	20,000
Labour	80,000	2,00,000	60,000
Other expenses	26,000	72,000	25,000

Indirect expenses amounting to ₹85,000 may be apportioned on the basis of wages. There was no opening or closing stock.

Ans. ₹2,76,000; ₹6,48,000; ₹7,68,000.

2. A product passes from Process–I and Process-II. Materials issued to Process-I amounted to ₹40,000, Wages ₹30,000 and manufacturing overheads were ₹27,000. Normal loss anticipated was 5% of input. 4,750 units of output were produced and transferred out from Process-I. There were no opening stocks. Input of raw material issued to Process-I were 5,000 units. Scrap has realisable value of ₹2 per unit. You are required to show Process-I account, value of normal loss and units transferred to Process-II. **[SM]**

3. A product passes from Process–I and Process-II. Materials issued to Process-I amounted to ₹40,000, Wages ₹30,000 and manufacturing overheads were ₹27,000. Normal loss anticipated was 5% of input. 4,550 units of output were produced and transferred out from Process-I. There were no opening stocks. Input of raw material issued to Process-I were 5,000 units. Scrap has realisable value of ₹2 per unit. You are required to show Process-I account, value of normal loss, value of abnormal loss/gain and units transferred to Process-II. **[SM]**

4. A product passes from Process–I and Process-II. Materials issued to Process-I amounted to ₹40,000, Wages ₹30,000 and manufacturing overheads were ₹27,000. Normal loss anticipated was 5% of input. 4,850 units of output were produced and transferred out from Process-I. There were no opening stocks. Input of raw material issued to Process-I were 5,000 units. Scrap has realisable value of ₹2 per unit. You are required to show Process-I account, value of normal loss, value of abnormal loss/gain and units transferred to Process-II. **[SM]**

5. A product passes through three processes, A, B and C. The normal wastage of each process is as follows:

Process A – 3 per cent

Process B – 5 per cent

Process C – 8 per cent

Wastage of process A was sold at 25 paise per unit, that of process B at 50 paise per unit and that of Process C at ₹1 per unit. 10,000 units were issued to Process A in the beginning of October at a cost of ₹1 per unit. The other expenses were as follows:

	Process A	Process B	Process C
	₹	₹	₹
Sundry Materials	1,000	1,500	500
Labour	5,000	8,000	6,500
Direct expenses	1,050	1,188	2,009

Actual output was:

Process A	9,500 units
Process B	9,100 units
Process C	8,100 units

Prepare the Process Accounts, assuming that there was no opening or closing stocks. Also give the Abnormal Wastage and Abnormal Effective Accounts.

Ans. ₹1.75; ₹3; ₹4.25.

6. A product passes through three processes – A, B and C. The details of expenses incurred on the three processes during the year were as under:

Process	A	B	C
Units issued/introduced cost per unit ₹100	10,000		
	₹	₹	₹
Sundry Materials	10,000	15,000	5,000
Labour	30,000	80,000	65,000
Direct Expenses	6,000	18,150	27,200
Selling price per unit of output	120	165	250

Management expenses during the year were ₹80,000 and selling expenses were ₹50,000. These are not allocable to the processes.

Actual output of the three processes was:

A – 9,300 units, B – 5,400 units and C – 2,100 units. Two thirds of the output of Process A and one – half of the output of Process B was passed on to the next process and the balance was sold. The entire output of Process C was sold.

The normal loss of the three process, calculated on the input of every process was: Process A – 5%, Process B – 15% and Process C – 20%. The loss of Process A was sold at ₹2 per unit, that of B at ₹5 per unit and of Process C at ₹10 per unit.

Prepare the three processes accounts and the Profit and Loss Account.

Ans. Loss ₹32,450.

7. The input to a purifying process was 16,000 kgs of basic material purchased @ ₹1.20 per kg. Process wages amounted to ₹720 and overhead was applied @ 240% of the labour cost. Indirect materials of negligible weight were introduced into the process at cost of ₹336. The actual output from the process weighed 15,000 kgs. The normal yield of the process is 92%. Any difference in weight between the input of basic material and output of purified material (product) is sold @ ₹0.50 per kg. The process is prepared under a license which provides for the royalty @ ₹0.15 per kg of the purified material produced. Prepare:

(a) Purifying process account
(b) Normal wastage account
(c) Abnormal wastage/yield account
(d) Royalty payable account

Ans. ₹1.60.

8. The following data are available pertaining to a product after passing through two processes A and B:

Output transferred to process C from Process B 9,120 units for ₹49,263

Expenses incurred in Process C:

Sundry Materials ₹1,480

Direct labour ₹6,500

Direct Expenses ₹1,605

The wastage of process C is sold at ₹1.00 per unit. The overhead charges were 168% of direct labour. The final product was sold at ₹10.00 per unit fetching a profit of 20% on sales. Find the percentage of wastage in process C and prepare Process C Account.

Ans. 5%.

9. An article passes through three successive operations from the raw material to the finished product stage. The following data are available from the production records of a particular month:

Operation No. Input	No. of Pcs. Input	No. of Pcs. Rejected	No. of Pcs. Output
1	60,000	20,000	40,000
2	66,000	6,000	60,000
3	48,000	8,000	40,000

(i) Determine the input required in the first operation in number of pieces in order to obtain finished output of 100 pieces after the last operation.

(ii) Calculate the cost of raw material required to produce one piece of finished product, given that weight of the finished piece is 0.10 kg and the price of raw material is ₹20 per kg.

Ans. (i) 198 units; (ii) ₹3.96.

10. The following information is extracted from the cost accounts of a factory producing a commodity in the manufacture of which three processes are involved. Prepare process accounts showing the cost of the output and the cost per unit at each stage of manufacture. You may presume that there is no WIP.

	Process 1	Process 2	Process 3
	(₹)	**(₹)**	**(₹)**
Direct wages	2,500	5,000	6,500
Machine Expenses	1,400	1,200	1,200
Factory Overheads	1,100	1,550	900
Raw materials consume	8,000	—	—
	Units	**Units**	**Units**
Production (Gross)	2,750	—	—
Wastage	150	210	200
Opening stock of raw materials	—	250	500
Closing stock of raw materials	—	440	100

Ans. ₹5; ₹9; ₹13.33.

11. The product of a company passes through three different processes – A, B and C. It is ascertained from past experience that wastage in each process is incurred as under:

Process A : 2%
Process B : 5%
Process C : 10%

The percentage of wastage in each case is computed on the basis of number of units entering the process concerned.

The wastage of each process has a scrap value. The wastage of process A and B is sold at ₹1 per unit and that of process C at ₹4 per unit. The company gives you the following information for the month of July:

2,000 units of crude material were introduced in process A at a cost of ₹8 per unit. Besides this the following were other expenses:

	Process A ₹	Process B ₹	Process C ₹
Material consumed	8,000	3,000	2,000
Direct Labour	12,000	8,000	6,000
Work Expenses	2,000	1,000	3,000
	Units	**Units**	**Units**
Output	1,950	1,925	1,590
Stock : July 1	200	300	500
July 31	150	400	
Stock valuation on July 1 per unit	19	27	36.5

Stocks on 31st July are to be valued at cost as shown by months' production accounts. Prepare the Process Accounts.

Ans. ₹19.36734; ₹26.61105; ₹35.90134.

12. A product passes through two processes A and B. From the following particulars relating to process A, find out equivalent production and prepare the relevant accounts.

Units introduced in process A – 2,000 valued at ₹5,800

Amount spent as labour and production overhead: ₹3,340 and ₹1,670 respectively

Direct materials introduced during the process – ₹1,440

1,400 completed units were produced in process A and transferred to process B. Incomplete units 460. Units scrapped 140 and sold at ₹1 per unit. The normal process loss was estimated at 5% on input. It was estimated that incomplete units had reached a stage in production as follows:

Materials (including units introduced)	75% completed
Labour	50% completed
Overhead	50% completed

13. With the help of the following information, prepare Process Account, giving full working notes:

[Nov 2011]

Opening stock of work in progress: 1,000 units at ₹10,000

Degree of completion: Material 100%, Labour 50%, Overhead 40%

Introduced during the process: 10,000 units at ₹37,800

Wages: ₹17,840

Overheads: ₹8,840

Scrap 1,500 units

Degree of Completion: Materials 100%, Labour 80%, Overheads 60%

Closing work in progress: 1,000 units

Degree of completion: Materials 100%, Labour 60%, Overheads 50%

Normal loss 10% of total input

Scrap value ₹2 per unit

14. A Company manufacturing chemical solution that passes through a number of processes uses FIFO method to value Work-in-Process and Finished Goods. At the end of month of September, a fire occurred in the factory and some papers containing records of the process' operations for the month were destroyed. The Company desires to prepare process accounts for the month during which the fire occurred. Some information could be gathered as to operating activities as under:

- Opening Work-in-process at the beginning of the month of 1,100 litres - 40% complete for labour and 60% complete for Overheads. Opening Work-in-Process was valued at ₹48,260.
- Closing Work-in-Process at the end of the month was 220 litres, 40% complete for Labour and 30% complete for Overheads.
- Normal loss is 10% of input and total losses during the month were 2,200 litres partly due to firm, damage. Assume degree of completion of abnormal losses is 100%.
- Output sent to Finished Goods Warehouse was 5,900 litres
- Losses have a scrap value of ₹20 per litre.
- All Raw Materials are added at the commencement of the process.
- The Cost per equivalent Unit (litre) is ₹53 for the month consisting:

	₹
Raw Material	35
Labour	8
Overheads	10
Total	53

You are required to:

(i) Calculate the quantity (in litres) of Raw Material input during the month.

(ii) Calculate the quantity (in litres) of Normal Loss and Abnormal loss/Gain experienced in the month.

(iii) Calculate the values of Raw Materials, Labour and Overheads added to the process during the month.

(iv) Prepare the Process Account for the month.

15. From the following data related to Process X, prepare process X account:

(a) Opening work in progress: 800 units valued as under:
Material = ₹3,200
Labour = ₹960
Overhead = ₹320

(b) Input of material = 9200 units

(c) Current cost: Material = ₹36,800
Labour = ₹16,740
Overhead = ₹7,930

(d) Normal loss = 8% of total input

(e) Scrap realized ₹40 per 10 units

(f) Closing work in progress = 900 units

(g) Transfer to next process = 7,900 units

(h) Degree of completion:

	Closing Stock	Scrap
Material	100%	100%
Labour	70%	80%
Overhead	30%	20%

16. The following data relate to Process Q:

(i) Opening work in process 4,000 units
Degree of completion:

Materials	100%	₹24,000
Labour	60%	₹14,400
Overheads	60%	₹7,200

(ii) Received during the month of April from Process P: 40,000 units for ₹1,71,000

(iii) Expenses incurred in Process Q during the month:

Material	₹79,000
Labour	₹1,38,230
Overheads	₹69,120

(iv) Closing work in process 3,000 units
Degree of completion: Material 100%; Labour & Overheads 50%

(v) Units scrapped 4,000 units
Degree of completion: Material 100%; Labour & Overheads 80%

(vi) Normal Loss: 5% of current input

(vii) Spoiled goods realized ₹1.50 each on sale

(viii) Completed units are transferred to warehouse

You are required to prepare:

(*a*) Equivalent units statement

(*b*) Statement of cost per equivalent unit and total costs

(*c*) Process Q Account

(*d*) Any other account necessary

17. A company produces a component, which passes through two processes. During the month of April, materials for 40,000 components were put into Process I of which 30,000 were completed and transferred to Process II. Those not transferred to Process II were 100% complete as to materials cost and 50% complete as to labour and overheads cost. The Process I cost incurred were as follows: **[SM]**

Direct Materials	₹15,000
Direct Wages	₹18,000
Factory Overheads	₹12,000

Of those transferred to Process II, 28,000 units were completed and transferred to finished goods stores. There was a normal loss with no salvage value of 200 units in Process II. There were 1,800 units, remained unfinished in the process with 100% complete as to materials and 25% complete as regard to wages and overheads.

No further process material costs occur after introduction at the first process until the end of the second process, when protective packing is applied to the completed components. The process and packing costs incurred at the end of the Process II were:

Packing Material	₹4,000
Direct Wages	₹3,500
Factory Overheads	₹4,500

Required:

(a) Prepare statement of equivalent production, cost per unit and Process I A/c.

(b) Prepare statement of equivalent production, cost per unit and Process II A/c.

18. SK Ltd. produces a product which passes through two processes before it is completed and transferred to finished stock. The following data relate to the month of December: **[SM]**

	Process I	Process II	Finished Stock
Opening stock	₹7,500	₹9,000	₹22,500
Direct materials	15,000	15,750	
Direct wages	11,200	11,250	
Factory overheads	10,500	4,500	

Closing stock	3,700	4,500	11,250
Inter process profit included in opening stock	—	1,500	8,250

Output of process I is transferred to Process II at 25% profit on the transfer price. Output of Process II is transferred to finished stock at 20% profit on the transfer price. Stocks in process are valued at prime cost. Finished stock is valued at the price at which it is received from Process II. Sales during the period are ₹1,40,000. Prepare process accounts and finished stock account showing the profit element at each stage.

PRACTICE QUESTIONS

19. A product passes through three process. The output of each process is treated as the raw material of the next process to which it is transferred and output of the third process is transferred to finished stock. **[SM]**

	Process – I (₹)	Process – II (₹)	Process – III (₹)
Materials issued	40,000	20,000	10,000
Labour	6,000	4,000	1,000
Manufacturing overhead	10,000	10,000	15,000

10,000 units have been issued to the Process-I and after processing, the output of each process is as under:

Process	Output	Normal loss
Process – I	9,750 units	2%
Process – II	9,400 units	5%
Process – III	8,000 units	10%

No stocks of material or of work-in-process was left at the end. Calculate the cost of the finished articles.

Ans. ₹5.7142; ₹9.6862; ₹13.8358.

20. SK Ltd. processes product Z through two distinct processes – Process I and process II. On completion , it is transferred to finished stock. From the following information for the current year, prepare Process I and Process II and Finished Stock A/c. **[SM, Nov 2019]**

Particulars	Process – I	Process - II
Raw materials used	7,500 units	-
Raw materials cost per unit	₹60	-
Transfer to next process/finished stock	7,050 units	6,525 units
Normal loss (on inputs)	5%	10%

Direct wages	₹1,35,750	₹,129,250
Direct expenses	60% of direct wages	65% of direct wages
Manufacturing overheads	20% of direct wages	15% of direct wages
Realisable value of scrap per unit	₹12.50	₹37.50

6,000 units of finished goods were sold at a profit of 15% on cost. Assume that there was no opening or closing stock of work-in-process.

Ans. ₹96.7947; ₹140.0496; Profit = ₹1,38,182.

21. SK Pvt. Ltd. produces a product "SKY" which passes through two processes, viz. Process-A and Process-B. The details for the year ending 31st March are as follows:

	Process A	Process B
40,000 Units introduced at a cost of	₹3,60,000	-
Material Consumed	₹2,42,000	2,25,000
Direct Wages	₹2,58,000	1,90,000
Manufacturing Expenses	₹1,96,000	1,23,720
Output in Units	37,000	27,000
Normal Wastage of Input	5%	10%
Scrap Value (per unit)	₹15	20
Selling Price (per unit)	₹37	61

Additional Information:

(a) 80% of the output of Process-A, was passed on to the next process and the balance was sold. The entire output of Process- B was sold.

(b) Indirect expenses for the year was ₹4,48,080.

(c) It is assumed that Process-A and Process-B are not responsibility centre.

Required:

(i) Prepare Process-A and Process-B Account.

(ii) Prepare Profit & Loss Account showing the net profit or net loss for the year.

Ans. (a) ₹27; ₹48; (b) loss ₹25,000.

22. The product of a manufacturing concern passes through two processes A and B and then to finished stock. It is ascertained that in each process normally 5% of the total weight is lost and 10% is scrap which from processes A and B realizes ₹80 per tonne and ₹200 per tonne respectively. The following are the figures relating to both the processes:

	Process A	Process B
Material in tonnes	1,000	70
Cost of Materials in rupees per tonne	125	200

Wages in rupees	28,000	10,000
Manufacturing expenses in rupees	8,000	5,250
Output in tonnes	830	780

Prepare Process Cost Accounts showing cost per tonne of each process. There was no stock or work-in-progress in any process.

Ans. ₹180; ₹210.

23. M Ltd. produces a product-X, which passes through three processes, I, II and III. In Process-III a by-product arises, which after further processing at a cost of ₹85 per unit, product Z is produced. The information related for the month of August 2020 is as follows: **[RTP Nov 2020]**

	Process-I	Process-II	Process-III
Normal loss	5%	10%	5%
Materials introduced (7,000 units)	1,40,000	-	-
Other materials added	62,000	1,36,000	84,200
Direct wages	42,000	54,000	48,000
Direct expenses	14,000	16,000	14,000

Production overhead for the month is ₹2,88,000, which is absorbed as a percentage of direct wages.

The scrapes are sold at ₹10 per unit

Product-Z can be sold at ₹135 per unit with a selling cost of ₹15 per unit

No. of units produced:

Process-I- 6,600; Process-II- 5,200, Process-III- 4,800 and Product-Z- 600

There is not stock at the beginning and end of the month.

You are required to PREPARE accounts for:

(i) Process-I, II and III

(ii) By-product process.

Ans. ₹50.9022; ₹10.3089; ₹108.3089.

24. A Manufacturing unit manufactures a product 'XYZ' which passes through three distinct Processes – X, Y and Z. The following data is given: **[July 2021]**

	Process X	Process Y	Process Z
Material consumed (in ₹)	2,600	2,250	2,000
Direct wages (in ₹)	4,000	3,500	3,000

The total production overhead of ₹15,750 was recovered @ 150% of direct wages.

- 15,000 units at ₹2 each were introduced to process 'X'.
- The output of each process passes to the next process and finally, 12,000 units were transferred to Finished Stock Account from Process 'Z'.
- No stock of materials or work in progress was left at the end.

The following additional information is given:

Process	% of wastage to normal input	Value of Scrap per unit (₹)
X	6%	1.10
Y	?	2.00
Z	5%	1.00

You are required to:

(i) Find out the percentage of wastage in process 'Y', given that the output of process 'Y' is transferred to Process 'Z' at ₹4 per unit.

(ii) Prepare Process accounts for the three processes X, Y and Z.

Ans. (i) 13.44%; (ii) ₹2.95106; ₹4; ₹4.97715.

25. Following details have been provided by M/s AR Enterprises: **[Nov 2018]**

(i) Opening works-in-progress - 3,000 units (70% complete)

(ii) Units introduced during the year - 17,000 units

(iii) Cost of the process (for the period) - ₹33,12,720

(iv) Transferred to next process - 15,000 units

(v) Closing works-in-progress - 2,200 units (80% complete)

(vi) Normal loss is estimated at 12% of total input (including units in process in the beginning). Scraps realize ₹50 per unit. Scraps are 100% complete.

Using FIFO method, compute:

(i) Equivalent production

(ii) Cost per equivalent unit

26. Opening work-in-process 1,000 units (60% complete); Cost ₹1,10,000. Units introduced during the period 10,000 units; cost ₹19,30,000. Transferred to next process – 9,000 units. **[SM]**

Closing work-in-process – 800 units (75% complete), normal loss is estimated at 10% of total input including units in process at the beginning. Scraps realise ₹10 per unit. Scraps are 100% complete.

Using FIFO method, compute equivalent production and cost per equivalent unit. Also evaluate the output.

27. SK Ltd. uses process costing to manufacture water density sensors for hydro sector. The following information pertains to operations for the month of May.

Particulars	Units
Beginning WIP, May 1	16,000
Started in production during May	1,00,000
Completed production during May	92,000
Ending work in progress, May 31	24,000

The beginning work in progress was 60% complete for materials and 20% complete for conversion costs. The ending inventory was 90% complete for material and 40% complete for conversion costs.

Costs pertaining to the month of May are as follows:

Beginning inventory costs are material ₹27,670, direct labour ₹30,120 and factory overheads ₹12,720.

Cost incurred during May are material used ₹4,79,000, direct labour ₹1,82,880, factory overheads ₹3,91,160.

Calculate:

(a) Using the FIFO method, the equivalent units of production for material.

(b) Cost per equivalent unit for conversion cost.

28. A company who manufactures cricket bat buys wood as its direct material. The forming department processes the cricket bats and the cricket bats are then transferred to the finishing department where stickers are applied. The forming department began manufacturing 10,000 initial bats during the month of December for the first time and their cost is as follows:

Direct material	₹33,000
Conversion cost	₹17,000
Total	₹50,000

A total of 8,000 cricket bats were completed and transferred to the finishing department, the rest 2,000 were still in the forming process at the end of the month. All of the forming departments direct material were placed, but on average, only 25% of the conversion costs was applied to the ending work in progress inventory.

Calculate:

(a) Equivalent units of production for each cost.

(b) The conversion cost per equivalent units

(c) Cost of closing work in process (WIP) and finished products.

29. A product is manufactured in two sequential processes, namely Process-1 and Process-2. The following information relates to Process-1. At the beginning of June 2019, there were 1,000 WIP goods (60% completed in terms of conversion cost) in the inventory, which are valued at ₹2,86,020 (Material cost ₹2,55,000 and Conversion cost ₹31,020). Other information relating to Process-1 for the month of June 2019 is as follows: **[RTP Nov 2019]**

Cost of materials introduced – 40,000 units (₹)	96,80,000
Conversion cost added (₹)	18,42,000
Transferred to Process – 2 (units)	35,000
Closing WIP (Units) (60% completed in terms of conversion cost)	1,500

100% of materials are introduced to Process-1 at the beginning. Normal loss is estimated at 10% of input materials (excluding opening WIP). Loss is 60% completed in terms of Conversion cost.

Required:

(a) Prepare a statement of equivalent units using the weighted average cost method

(b) Calculate the value of output transferred to Process-2 and closing WIP.

30. ABC Ltd. produces an item which is completed in three processes – X, Y and Z. The following information is furnished for process X for the month of March, 2018: **[May 2018]**

Opening work-in-progress (5,000 units):

Materials	₹35,000

Labour	₹13,000
Overheads	₹25,000
Units introduced into process X (55,000 units):	
Materials	₹20,20,000
Labour	₹8,00,000
Overheads	₹13,30,000
Units scrapped: 5,000 units	
Degree of completion:	
Materials	100%
Labour & Overheads	60%
Closing work-in-progress (5,000 units):	
Degree of completion:	
Materials	100%
Labour & Overheads	60%

Units finished and transferred to Process Y: 50,000 units

Normal loss: 5% of total input (including opening works-in-progress) Scrapped units fetch ₹20 per unit.

Presuming that average method of inventory is used, prepare:

(i) Statement of Equivalent production

(ii) Statement of Cost for each element

(iii) Statement of distribution of cost

(iv) Abnormal loss account

31. Following information is available regarding Process-I for the month of February:

Production Record:	
Units in process as on 1st February	4,000
(All materials used, 25% complete for labour and overhead)	
New units introduced	16,000
Units completed	14,000
Units in process as on 28th February	6,000
(all materials used, 33-1/3% complete for labour and overheads)	
Cost Records:	
Work-in-process as on 1st February	(₹)
Materials	6,000
Labour	1,000
Overheads	1,000
	8,000
Cost during the month:	
Materials	25,600
Labour	15,000
Overheads	15,000
	55,600

Presuming that average method of inventory is used, prepare:

(a) Statement of equivalent production

(b) Statement showing cost for each element

(c) Statement of apportionment of cost

(d) Process cost account for Process-I

32. Following details are related to the work done in Process-I by SK Company during the month of March:

Opening work-process (2,000 units)	(₹)
Material	80,000
Labour	15,000
Overheads	45,000
Materials introduced in Process-I (38,000 units)	14,80,000
Direct Labour	3,59,000
Overheads	10,77,000

Units scrapped: 3,000 units

Degree of completion:

Materials	100%
Labour and overheads	80%

Closing work-in-process: 2,000 units

Degree of completion:

Materials	100%
Labour and overheads	80%

Units finished and transferred to Process-II: 35,000 units

Normal loss:

5% of total input including opening work-in-process.

Scrapped units fetch ₹20 per piece.

You are required to prepare using average method

(a) Statement of equivalent production

(b) Statement of cost

(c) Statement of distribution cost, and

(d) Process-I Account, Normal Loss Account and Abnormal Loss Account.

33. 'Healthy Sweets' is engaged in the manufacturing of jaggery. Its process involves sugarcane crushing for juice extraction, then filtration and boiling of juice along with some chemicals and then letting it cool to cut solidified jaggery blocks.

The main process of juice extraction (Process – I) is done in conventional crusher, which is then filtered and boiled (Process – II) in iron pots. The solidified jaggery blocks are then cut, packed and

dispatched. For manufacturing 10 kg of jaggery, 100 kg of sugarcane is required, which extracts only 45 litres of juice.

Following information regarding Process- I has been obtained from the manufacturing department of Healthy Sweets for the month of January:

	(₹)
Opening work-in-process (4,500 litre)	
Sugarcane	50,000
Labour	15,000
Overheads	45,000
Sugarcane introduced for juice extraction (1,00,000 kg)	5,00,000
Direct labour	2,00,000
Overheads	6,00,000
Abnormal loss: 1,000 kg	
Degree of completion:	
Sugarcane	100%
Labour and overheads	80%
Closing Work-in-Process: 9,000 litres	
Sugarcane	100%
Labour and overheads	80%
Extracted juice transferred for filtering and boiling: 39,500 litre	

(Consider mass of 1 litre of juice equivalent to 1 kg)

You are required to prepare using average method:

(a) Statement of equivalent production
(b) Statement of cost
(c) Statement of distribution cost, and
(d) Process – I Account

34. Following details are related to the work done in Process-I by ABC Ltd. during the month of May 2019: **[Nov 2020]**

	(₹)
Opening work-in-process (3,000 units)	
Materials	1,80,500
Labour	32,400
Overheads	90,000
Material introduced in Process-I (42,000 units)	36,04,000
Labour	4,50,000
Overheads	15,18,000

Units scrapped : 4,800 units

Degree of completion:

Materials : 100%

Labour & Overheads : 70%

Closing work-in-progress : 4,200 units

Degree of completion:

Materials : 100%

Labour & Overheads : 50%

Units finished and transferred to Process-II: 36,000 units

Normal loss:

4% of total input including opening work-in-process

Scrapped units fetch ₹62.50 per piece

Prepare:

(i) Statement of equivalent production

(ii) Statement of cost per equivalent unit

(iii) Process-I A/c

(iv) Normal loss account and

(v) Abnormal loss account

35. STG Limited is a manufacturer of chemical 'GK', which is required for industrial use. The complete production operation requires two processes. The raw material first passes through Process I, where chemical 'G' is produced. Following data is furnished for the month of April, 2022:

Particulars	(in kgs)
Opening work-in-progress quantity (Material 100% and conversion 50% complete)	9,500
Material input quantity	1,05,000
Work completed quantity	83,000
Closing work-in-progress quantity (Material 100% and conversion 60% complete)	16,500

You are further provided that:

Particulars	(in ₹)
Opening work-in-progress cost	
Material cost	29,500
Processing cost	14,750
Material input cost	3,34,500
Processing cost	2,53,100

Normal process loss may be estimated at be 10% of material input. It has no realizable value. Any loss over and above normal loss is considered to be 100% complete in material and processing.

The company transfers 60,000 kgs of output (Chemical G) from Process I to Process II for producing Chemical 'GK'. Further materials are added in Process II which yield 1.20 kg. of chemical 'GK' for every kg of chemical 'G' introduced. The chemicals transferred to Process II for further processing are then sold as chemical 'GK' for ₹10 per kg. Any quantity of output completed in Process I, are sold as chemical 'G' @ ₹9 per kg.

The monthly costs incurred in Process II (other than the cost of chemical 'G') are:

Input 60,000 kg of chemical 'G'

Material Cost	₹85,000
Processing costs	₹50,000

You are required:

(i) Prepare statement of Equivalent production and determine the cost per kg of chemical 'G' in Process I using the weighted average cost method.

(ii) Prepare a statement showing cost of Chemical 'G' transferred to Process II, cost of abnormal loss and cost of closing work-in-progress.

(iii) STG is considering the option to sell 60,000 kg of chemical 'G' of Process I without processing it further in Process-II. Will it be beneficial for the company over the current pattern of processing 60,000 kg in process-II?

(Note: You are not required to prepare Process Account)

36. Aditya Agro Ltd. mixes powdered ingredients in two different processes to produce one product. The output of Process-I becomes the input of Process-II and the output of Process-II is transferred to the Packaging department. **[MTP Nay 2019]**

From the information given below, you are required to prepare accounts for Process-I, Process-II and Abnormal loss / gain to record the transactions for the month of February 2019.

Process-I

Input	
Material A	6,000 kilograms at ₹50 per kilogram
Material B	4,000 kilograms at ₹100 per kilogram
Labour	430 hours at ₹50 per hour
Normal Loss	5% of inputs. Scrap are disposed off at ₹16 per kilogram
Output	9,200 kilograms

There is no work-in-progress at the beginning or end of the month.

Process-II

Input	
Material C	6,600 kilograms at ₹125 per kilogram
Material D	4,200 kilograms at ₹75 per kilogram
Flavoring Essence	₹3,300

Labour	370 hours at ₹50 per hour
Normal Loss	5% of inputs with no disposal value
Output	18,000 kilograms

There is no work-in-process at the beginning of the month but 1,000 kilograms in process at the end of the month and estimated to be only 50% complete so far as labour and overhead were concerned.

Overheads of ₹92,000 incurred to be absorbed on the basis of labour hours.

37. KT Ltd. produces a product EMM which passes through two processes before it is completed and transferred to finished stock. The following data relate to May 2019. **[May 2019]**

Particulars	Process A	Process B	Finished Stock
Opening stock	₹5,000	₹5,500	₹10,000
Direct materials	9,000	9,500	
Direct wages	5,000	6,000	
Factory overheads	4,600	2,030	
Closing stock	2,000	2,490	5,000
Inter process profit included in opening stock	--	1,000	4,00

Output of Process A is transferred to Process B at 25% profit on the transfer price and output of Process B is transferred to finished stock at 20% profit on the transfer price. Stock in process is valued at prime cost. Finished stock is valued at the price at which it is received from Process B. Sales during the period are ₹75,000.

Prepare the process cost accounts and Finished stock account showing the profit element at each stage.

38. The product of a manufacturing concern passes through two processes A and B and then to finished stock. The details of expenses incurred on the two processes during the year were as under:

Particulars	Process A (₹)	Process B (₹)
Material	40,000	-
Labour	40,000	56,000
Overheads	16,000	40,000

On completion, the output of Process A is transferred to Process B at a price calculated to give a profit of 20% on the transfer price and the output of Process B is charged to finished stock at a profit of 25% on the transfer price. The finished stock department realized ₹ 4,00,000 for the finished goods received from Process B. You are asked to show process accounts and total profit, assuming that there was no opening or closing work-in-progress. **[MTP May 2024]**

Ans. Total Profit = ₹ 2,08,000

39. A product passes through Process-I. Input raw material issued were 8,000 units. Normal loss anticipated was 10% of input with realisable value of ₹ 5 per unit. 7,600 units of output were produced and transferred to next process. If the total cost incurred under Process-I was ₹ 40,000, then amount of abnormal gain/(loss) is:

(a) ₹ 2,000 (b) (₹ 5,000) (c) (₹ 2,500) (d) ₹ 2,000

Ans. (d) ₹ 2,000

40. Arnav Ltd. manufactures chemical solutions used in paint and adhesive products. Chemical solutions are produced in different processes. Some of the processes are hazardous in nature which may results in fire accidents.

At the end of the last month, one fire accident occurred in the factory. The fire destroyed some of the paper files containing records of the process operations for the month.

You being an associate to the Chief Manager (Finance), are assigned to prepare the process accounts for the month during which the fire occurred. From the documents and files of other sources, following information could be retrieved:

Opening work-in-process at the beginning of the month was 500 litres, 80% complete for labour and 60% complete for overheads. Opening work-in-process was valued at ₹ 2,78,000.

Closing work-in-process at the end of the month was 100 litres, 20% complete for labour and 10% complete for overheads.

Normal loss is 10% of input (fresh) and total losses during the month were 800 litres partly due to the fire damage.

Output transferred to finished goods was 3,400 litres.

Losses have a scrap value of ₹ 20 per litre.

All raw materials are added at the commencement of the process.

The cost per equivalent unit is ₹ 660 for the month made up as follows:

Raw Material ₹ 300 Labour ₹ 200 Overheads ₹ 160

The company uses FIFO method to value work-in-process and finished goods.

The following information are required for managerial decisions:

(i) How much quantity of raw material introduced during the month?

(a) 4,300 Litres (b) 3,500 Litres (c) 4,200 Litres (d) 3,800 Litres

(ii) The Quantity of normal loss and abnormal loss are:

(a) Normal loss- 380 litres & Abnormal loss- 420 litres

(b) Normal loss- 350 litres & Abnormal loss – 450 litres

(c) Normal loss- 430 litres & Abnormal loss – 370 litres

(d) Normal loss- 420 litres & Abnormal loss – 380 litres.

(iii) Value of raw material added to the process during the month is:

(a) ₹ 10,10,000 (b) ₹ 10,33,600 (c) ₹ 10,18,400 (d) ₹ 10,20,000

(iv) Value of labour and overhead in closing Work-in-process are:

(a) A. ₹ 4,000 & ₹ 1,600 respectively (b) ₹ 20,000 & ₹ 16,000 respectively

(c) ₹ 16,000 & ₹ 9,000 respectively (d) ₹ 13,200 & ₹ 6,600 respectively

(v) Value of output transferred to finished goods is:

(a) ₹ 22,57,200 (b) ₹ 20,06,400

(c) ₹ 22,44,000 (d) ₹ 19,27,200

Ans. (i) - (d), (ii) - (a), (iii) - (b), (iv) - (a), (v) - (c)

19.

Process - I Account

Particulars	Units	Amount	Particulars	Units	Amount
To Material	10,000	40,000	By Normal Loss A/c	200	-
To Labour	-	6,000	(10,000 × 2%)		
To Manufacturing OHs	-	10,000	By Abnormal loss A/c	50	286
			(50 × 5.7142)		
			By Process II A/c	9,750	55,714
			(9,750 × 5.7142)		
	10,000	56,000		10,000	56,000

Normal cost per unit = $\frac{56,000-0}{10,000-200} = \frac{56,000}{9,800}$ = ₹5.742

Process - II Account

Particulars	Units	Amount	Particulars	Units	Amount
To Process I A/c	9,750	55,714	By Normal Loss A/c	488	-
To Material	-	20,000	(9,750× 5%)		
To Labour	-	4,000	By Process III A/c	9,400	91,051
To Direct Manufacturing OHs	-	10,000	(9,400 × 9.6862)		
To Abnormal gain A/c	138	1,337			
(138 × 9.6862)					
	9,888	91,051		9,888	91,051

Normal cost per unit = $\frac{89,714-0}{9,750-488}$ = ₹9.6862

Process - III Account

Particulars	Units	Amount	Particulars	Units	Amount
To Process II A/c	9,400	91,051	By Normal Loss A/c	940	-
To Material	-	10,000	(9,400 × 10%)		
To Labour	-	1,000	By Abnormal loss A/c	460	6,364
To Manufacturing OHs	-	15,000	(460 × 13.8358)		
			By Finished Goods A/c	8,000	1,10,687

			(8,000 × 13.8358)		
	9,400	1,17,051		9,400	1,17,051

Normal cost per unit = $\frac{1,17,051-0}{9,400-940}$ = ₹13.8358

20.

Process - I Account

	Qty.	Amount		Qty.	Amount
To Raw material	7,500	4,50,000	By Normal Loss	375	4.688
To Direct wages		1,35,750	(5%×7,500 ₹12.5)		
To Direct expenses		81,450	By Abnormal Loss	75	7,259
(60% of direct wages)			(75 × 96.7947)		
To Manufacturing OHs		27,150	By Process II A/c	7,050	6,82,403
(20% of direct wages)			(7,050 × 96.7947)		
	7,500	6,94,350		7,500	6,94,350

Planned output – Process I = 7,500 – 375 = 7,125 units
Actual output = 7,050 units
Abnormal loss = (7,125 units – 7,050 units) 75 units.

Cost per unit = $\frac{6,94,350-4,688}{7,125}$ = ₹96.7947

Process - II Account

	Qty.	Amount		Qty.	Amount
To Process I	7,050	6,82,403	By Normal loss (10%)	705	26,438
To Direct wages		1,29,250	(7,050 × 10% × 37.5)		
To Direct Expenses		84,013	By Finished Stock A/c	6,525	9,13,824
(65% of direct wages)			(6,525 × 140.096		
To Manufacturing OHs		19,387			
To Abnormal gain	180	25,209			
(180 × 140.096)	7,230	9,40,262		7,230	9,40,262

Planned output of Process II = 7,050 – 705 = 6,345 units

Cost per unit = $\frac{9,15,053-26,438}{6,345}$ = ₹140.096

Abnormal gain = Actual output – Planned output = 6,525 – 6,345 = 180 units

Finished Stock Account

	Qty.	Amount		Qty.	Amount
To Process II	6,525	9,13,824	By Cost of Sales A/c By Balance c/d	6,000 525	8,40,298 73,526
	6,525	9,13,824		6,525	9,13,824

Income Statement

	Amount		Amount
To Cost of Sales (6,000 × 140.096)	8,40,298	By Abnormal Gain [180 × (140.0496 – 37.5)]	18,459
To Abnormal loss [75 × (96.7947 – 12.50)]	6,322	By Sales (8,40,298 × 115%)	9,66,343
To Net Profit	1,38,182		
	9,84,802		9,84,802

21.

Process- A Account

Particulars	Units	Amount (₹)	Particulars	Units	Amount (₹)
To Input	40,000	3,60,000	By Normal Wastage (2,000 units × ₹15)	2,000	30,000
To Material	—	2,42,000	By Abnormal loss A/c (1,000 units × ₹27)	1,000	27,000
To Direct Wages	—	2,58,000	By Process B A/c (29,600 units × ₹27)	29,600	7,99,200
To Manufacturing Exp.	—	1,96,000	By Profit and Loss A/c (7,400 units × ₹27)	7,400	1,99,800
	40,000	10,56,000		40,000	10,56,000

Cost per unit = $\frac{10,56,000-30,000}{40,000-2,000}$ = ₹27

Process- B Account

Particulars	Units	Amount (₹)	Particulars	Units	Amount (₹)
To Process- A A/c	29,600	7,99,200	By Normal wastage (2,960 units × ₹20)	2,960	59,200
To Material	—	2,25,000	By Profit & Loss A/c (27,000 units × ₹48)	27,000	12,96,000
To Direct Wages	—	1,90,000			

To Manufacturing Exp.	—	1,23,720			
To Abnormal Gain A/c (360 units × ₹48)	360	17,280			
	29,960	13,55,200		29,960	13,55,200

Cost per unit = $\frac{13,37,920-59,200}{29,600-2,960}$ = ₹48

(i) **Profit & Loss Account**

Particulars	Amount (₹)	Particulars	Amount (₹)
To Process A A/c	1,99,800	By Sales:	
To Process B A/c	12,96,00	- Process A (7,400 units × ₹37)	2,73,800
To Abnormal loss A/c	12,000	- Process B (27,000 units × ₹61)	16,47,00
To Indirect Exp.	4,48,080	By Abnormal gain	10,080
		By Net loss	25,000
	19,55,880		19,55,880

Working notes:

Normal wastage (Loss) account

Particulars	Units	Amount (₹)	Particulars	Units	Amount (₹)
To Process A A/c	2,000	30,000	By Abnormal Gain A/c (360units × ₹20)	360	7,200
To Process B A/c	2,960	59,200	By Bank (Sales)	4,600	82,000
	4,960	89,200		4,960	89,200

Abnormal loss account

Particulars	Units	Amount (₹)	Particulars	Units	Amount (₹)
To Process A A/c	1,000	27,000	By Bank A/c (1,000 units × ₹15)	1,000	15,000
			By Profit & Loss A/c	—	12,000
	1,000	27,000		1,000	27,000

Abnormal Gain Account

Particulars	Units	Amount (₹)	Particulars	Units	Amount (₹)
To Normal Loss A/c (360 units × ₹20)	360	7,200	By Process B A/c	360	17,280
To Profit & Loss A/c		10,080			
	360	17,280		360	17,280

22. **Process - A Account**

Particulars	Units	Amount	Particulars	Units	Amount
To Material	1,000	1,25,000	By Normal loss A/c	50	-
To Wages	-	28,000	(Weight loss) (1,000 × 5%)		
To Manufacturing expenses	-	8,000	By Normal loss A/c	100	8,000
			(1,000 × 10% × 80)		
			By Abnormal loss A/c	20	3,600
			(20 × 180)		
			By Process B A/c	830	1,49,400
			(830 × 180)		
	1,000	1,61,000		1,000	1,61,000

Normal cost per unit = $\frac{1,61,000-8,000}{1,000-50-100} = \frac{1,53,000}{850} = ₹180$

Process - B Account

Particulars	Units	Amount	Particulars	Units	Amount
To Process A A/c	830	1,49,400	By Normal loss A/c	45	-
To Material	70	14,000	(Weight loss) (900 × 5%)		
To Wages	-	10,000	By Normal loss A/c	90	18,000
To Manufacturing expenses	-	5,250	(900 × 10% × 200)		
To Abnormal Gain A/c	15	3,150	By Finished Goods A/c	780	1,63,800
(15 × 210)			(780 × 210)		
	915	1,81,800		915	1,81,800

Normal cost per unit = $\frac{1,78,650-18,000}{830+70-45-90} = \frac{1,60,650}{765} = ₹210$

23. (i) Process - I Account

Particulars	Units	Amount(₹)	Particulars	Units	Amount(₹)
To Material	7,000	1,40,000	By Normal loss (7,000 × 5% × ₹10)	350	3,500
To Other Material	--	62,000	By Abnormal loss A/c (50 × ₹50.9022)	50	2,545
To Direct Wages	--	42,000	By Process II A/c (6,600 × ₹50.9022)	6,600	3,35,955

To Direct Exp.	--	14,000			
To Prod. OHs (200% × ₹42,000)	--	84,000			
	7,000	3,42,000		7,000	3,42,000

$$\text{Cost per unit} = \frac{3,42,000 - 3,500}{7,000 - 350} = \frac{3,38,500}{6,650} = ₹50.9022$$

Process - II Account

Particulars	Units	Amount(₹)	Particulars	Units	Amount(₹)
To Process-I A/c	6,600	3,35,955	By Normal loss (6,600 × 10% × ₹10)	660	6,600
To Other Material	--	1,36,000	By Abnormal loss A/c (740 × ₹108.3089)	740	80,149
To Direct Wages	--	54,000	By Process III A/c (5,200 × ₹108.3089)	5,200	5,63,206
To Direct Exp.	--	16,000			
To Prod. OHs (200% × ₹54,000)	--	1,08,000			
	6,600	6,49,955		6,600	6,49,955

$$\text{Cost per unit} = \frac{6,49,955 - 6,600}{6,600 - 660} = \frac{6,43,355}{5,940} = ₹108.3089$$

Process - III Account

Particulars	Units	Amount(₹)	Particulars	Units	Amount(₹)
To Process-II A/c	5,200	5,63,206	By Normal loss (5,200 × 5% × ₹10)	260	2,600
To Other Material	--	84,200	By Product X A/c (4,800 × ₹180.1396)	4,800	8,64,870
To Direct Wages	--	48,000	By Product Z A/c [600 × (135-85-15)]	600	21,000
To Direct Exp.	--	14,000			
To Prod. OHs (200% × ₹48,000)	--	96,000			
To Ab. Gain (460 × ₹180.1396)					
	5,660	8,88,270		5,660	8,88,270

$$\text{Cost per unit} = \frac{8,05,406 - 2,600 - 21,000}{5,200 - 260 - 600} = \frac{7,81,806}{4,340} = ₹180.1396$$

(ii) By-Product Process Account

Particulars	Units	Amount(₹)	Particulars	Units	Amount(₹)
To Process-III A/c	600	21,000	By Product Z A/c	600	81,000
To Processing cost	--	51,000			
To Selling exp.	--	9,000			
	600	81,000		600	81,000

24.

(i) Let normal loss units in process Y = y

$$\text{Normal cost per unit of Process Y} = \frac{\text{Total Cost-Scrap value of normal loss}}{\text{Total units-Normal loss unit}}$$

$$4 = \frac{52,610 - 2y}{14,100 - y}$$

$$56,400 - 4y = 52,610 - 2y$$

$$2y = 3,790$$

$$y = 1,895$$

$$\text{Thus, Normal loss \% of process Y} = \frac{1,895}{14,100} \times 100 = 13.44\%$$

(ii) Process X Account

Particulars	Units	Amount	Particulars	Units	Amount
To Units Introduced	15,000	30,000	By Normal loss A/c	900	990
To Material consumed	-	2,600	(15,000 × 6% × 1.10)		
To Labour	-	4,000	By Process Y A/c	14,100	41,610
To Overheads	-	6,000			
(4,000 × 150%)	15,000	42,600		15,000	42,600

$$\text{Normal cost per unit} = \frac{42,600 - 990}{15,000 - 900} = \frac{41,610}{14,100} = ₹2.95106$$

Process Y Account

Particulars	Units	Amount	Particulars	Units	Amount
To Process X A/c	14,100	41,610	By Normal loss A/c	1,895	3,790
To Material consumed	-	2,250	(Part (i))		
To Labour	-	3,500	By Process Z A/c	12,205	48,820
To Overheads	-	5,250			
(3,500 × 150%)	14,100	52,610		14,100	52,610

Process Z Account

Particulars	Units	Amount	Particulars	Units	Amount
To Process Y A/c	12,205	48,820	By Normal loss A/c	610	610
To Material consumed	-	2,000	(12,205 × 5% × 1)		
To Labour	-	3,000	By Finished Stock A/c	12,000	59,725
To Overheads	-	4,500	(12,000 × 4.97715)		
(3,000 × 150%)					
To Abnormal Gain A/c	405	2,015			
(405 × 4.97715)	12,610	60,335		12,610	60,335

Normal cost per unit = $\frac{58,320-610}{12,205-610} = \frac{57,710}{11,595}$ = ₹4.97715

25.

Statement of Equivalent Production

Input		Output		Material	
				%	Units
Op. WIP	3,000	Op. WIP	3,000	30	900
Input	17,000	Introduced & Complete	12,000	100	12,000
		Transferred	15,000		
		Normal Loss (20,000×12%)	2,400	-	-
		Abnormal Loss (Bal. fig.)	400	100	400
		Closing WIP	2,200	80	1,760
	20,000		20,000		15,060

Statement of cost per equivalent production unit:

Cost of the Process	₹33,12,720
Less: Scrap value of normal loss (₹50 × 2,400)	(₹1,20,000)
Total Process Cost	₹31,92,720
Total equivalent units	15,060
Cost per equivalent production unit	₹212

26. **Statement of Equivalent Production**

Input		Output		Material	
				%	Units
Op. WIP	1,000	Op. WIP	1,000	40	400
Input	10,000	Introduced & Complete	8,000	100	8,000
		Transferred	9,000		
		Normal Loss (11,000×10%)	1,100	-	-
		Abnormal Loss (Bal. fig.)	100	100	100
		Closing WIP	800	75	600
	11,000		11,000		9,100

Statement of cost per equivalent production unit:

Cost of the Process	₹19,30,000
Less: Scrap value of normal loss (₹10 × 1,100)	(₹11,000)
Total Process Cost	₹19,19,000
Total equivalent units	9,100
Cost per equivalent production unit	₹210.88

Statement of Evaluation

Particulars	Equivalent Units	Cost per EU (₹)	Amount (₹)
Opening WIP completed during the period	400	210.88	84,352
Add: WIP at beginning	-	-	1,10,000
Completed cost of 1,000 units of Op. WIP	1,000	194.35	1,94,352
Completely processed units	8,000	210.88	16,87,040
Abnormal loss	100	210.88	21,088
Closing WIP	600	210.88	1,26,528

27.

(i) Statement of Equivalent Production

Input		Output		Material		Conversion cost	
				%	Units	%	Units
Op. WIP	16,000	Op. WIP	16,000	40	6,400	80	12,800
Input	1,00,000	Introduced & Complete	76,000	100	76,000	100	76,000

	Transferred	92,000				
	Closing WIP	24,000	90	21,600	40	9,.600
1,16,000		1,16,000		1,04,000		98,400

(ii) Statement of cost per equivalent unit for conversion costs

Direct labour	₹1,82,880
Factory overheads	₹3,91,160
Total	₹5,74,040
Equivalent units	98,400
Cost per equivalent unit	₹5.83

28.

(i) Statement of Equivalent Production

Input		Output		Material		Conversion cost	
				%	Units	%	Units
Input	10,000	Introduced & Complete	8,000	100	8,000	100	8,000
		Closing WIP	2,000	100	2,000	25	500
10,000		10,000			10,000		8,500

(ii) Calculation of cost per equivalent unit

Particulars	Direct Material	Conversion Costs
Total Cost (₹)	33,000	17,000
Equivalent units	10,000	8,500
Cost per equivalent unit (₹)	3.30	2.00

(iii) Cost of closing WIP = (2,000 × 3.30) + (500 × 2.00) = ₹7,600
Cost of finished product = (8,000 × 3.30) + (8,000 × 2.00) = ₹42,400

29.

(a) Statement of Equivalent Production

Input		Output		Material		Conversion cost	
				%	Units	%	Units
Op. WIP	1,000	Op. WIP	1,000	100	1,000	100	1,000
Input	40,000	Introduced & Complete	34,000	100	34,000	100	34,000

	Transferred	35,000				
	Normal Loss (10%×40,000)	4,000	-	-	-	-
	Abnormal Loss	500	100	500	60	300
	Closing WIP	1,500	100	1,500	60	900
41,000		41,000		37,000		36,200

(b) Calculation of value of output transferred to Process-2 and Closing WIP

Value of units completed and transferred

- Material (35,000 × 268.51) = 93,97,850
- Conversion cost (35,000 × 51.74) = 18,10,900

1,12,08,750

Value of closing WIP

-
- Material (1,500 × 268.51) = 4,02,765
- Conversion cost (900 × 51.74) = 45,566

4,49,331

Working Note:

Calculation of cost of each element

Particulars	Material	Conversion Cost
Cost incurred during the month	96,80,000	18,42,000
Cost of Opening WIP	2,55,000	31,020
Total Cost (A)	99,35,000	18,73,020
Equivalent Units (B)	37,000	36,200
Cost per equivalent unit (A ÷ B)	**268.51**	**51.74**

30. Statement of Equivalent Production

Input		Output		Material		Labour		Overheads	
				%	Units	%	Units	%	Units
Op. WIP	5,000	Op. WIP	5,000	100	5,000	100	5,000	100	5,000
Input	55,000	Introduced & Complete	45,000	100	45,000	100	45,000	100	45,000
		Transferred	50,000						

	Normal Loss	3,000	-	-	-	-	-	-
	(60,000×5%) Abnormal Loss (Bal. Fig.)	2,000	100	2,000	60	1,200	60	1,200
	Closing WIP	5,000	100	5,000	60	3,000	60	3,000
60,000		60,000		57,000		54,200		54,200

Statement of Cost per Equivalent Unit

Particulars	Material	Labour	Overheads
Cost	20,20,000	8,00,000	13,30,000
Add: Cost of Opening WIP	35,000	13,000	25,000
Less: Normal Scrap (3,000 × 20)	(60,000)	-	-
Total	19,95,000	8,13,000	13,55,000
Equivalent Units	57,000	54,200	54,200
Cost per equivalent unit	35	15	25

Statement of distribution of cost

Particulars	Element of Cost	Equivalent units	Cost per unit	Cost	Total Cost
Opening WIP	Material	5,000	35	1,75,000	
	Labour	5,000	15	75,000	
	Overheads	5,000	25	1,25,000	3,75,000
Introduced & Complete	Material	45,000	35	15,75,000	
	Labour	45,000	15	6,75,000	
	Overheads	45,000	25	11,25,000	33,75,000
Abnormal Loss	Material	2,000	35	70,000	
	Labour	1,200	15	18,000	
	Overheads	1,200	25	30,000	1,18,000
Closing WIP	Material	5,000	35	1,75,000	
	Labour	3,000	15	45,000	
	Overheads	3,000	25	75,000	2,95,000

Abnormal Loss Account

Particulars	Units	Amount	Particulars	Units	Amount
To Process – X A/c	2,000	1,18,000	By Cash A/c (2,000 × 20)	2,000	40,000
			By Costing P&L A/c (bal. fig)	-	78,000
	2,000	1,18,000		2,000	1,18,000

31.

(i) Statement of Equivalent Production

Input		Output		Material		Labour		Overheads	
				%	Units	%	Units	%	Units
Op. WIP	4,000	Op. WIP	4,000	100	4,000	100	4,000	100	4,000
Input	16,000	Introduced & Complete	10,000	100	10,000	100	10,000	100	10,000
		Transferred	14,000						
		Closing WIP	6,000	100	6,000	33-1/3	2,000	33-1/3	2,000
	20,000		20,000		20,000		16,000		16,000

(ii) Statement of Cost per Equivalent Unit

Particulars	Material	Labour	Overheads
Current Cost	25,600	15,000	15,000
Add: Cost of Opening WIP	6,000	1,000	1,000
Total	31,600	16,000	16,000
Equivalent Units	20,000	16,000	16,000
Cost per equivalent unit	1.58	1	1

Statement of apportionment of cost

Particulars	Element of Cost	Equivalent units	Cost per unit	Cost	Total Cost
Opening WIP	Material	4,000	1.58	6,320	
	Labour	4,000	1	4,000	
	Overheads	4,000	1	4,000	14,320
Introduced & Comp.	Material	10,000	1.58	15,800	
	Labour	10,000	1	10,000	
	Overheads	10,000	1	10,000	35,800

Closing WIP	Material	6,000	1.58	9,480	
	Labour	2,000	1	2,000	
	Overheads	2,000	1	2,000	13,480

(iii) Process - I Account

Particulars	Units	Amount	Particulars	Units	Amount
To Opening WIP	4,000	8,000	By Process -II A/c	14,000	50,120
To Material	16,000	25,600	By Closing WIP	6,000	13,480
To Labour	-	15,000			
To Overheads	-	15,000			
	20,000	63,600		45,000	58,74,900

32.

(i) Statement of Equivalent Production

Input		Output		Material		Labour		Overheads	
				%	Units	%	Units	%	Units
Op. WIP	2,000	Op. WIP	2,000	100	2,000	100	2,000	100	2,000
Input	38,000	Introduced & Complete	33,000	100	33,000	100	33,000	100	33,000
		Transferred	35,000						
		Normal Loss (40,000×5%)	2,000	-	-	-	-	-	-
		Abnormal Loss (Bal. fig.)	1,000	100	1,000	80	800	80	800
		Closing WIP	2,000	100	2,000	80	1,600	80	1,600
	40,000		40,000		38,000		37,400		37,400

(ii) Statement of Cost

Details	Cost at the beginning of process	Cost added	Total cost	Equivalent Units	Cost per unit
Material	80,000	14,80,000	15,60,000		
Less: Value of Nr. loss			(20×2,000=40,000) 15,20,000	38,000	40
	15,000	3,59,000	3,74,000	37,400	10
Labour	45,000	10,77,000	11,22,000	37,400	30
Overheads					80

(iii) Statement of distribution of cost:

(*a*) Completed and transferred to process 'B' = 35,000 units @ ₹80 = 28,00,000

(*b*) Abnormal loss: 1,000 units:

Material 1,000 units @ 40	= ₹40,000
Labour and Overheads 800 units @ 40	= ₹32,000
	= ₹72,000

(*c*) Closing WIP: 2,000 units

Materials 2,000 units @ 40	= ₹80,000
Labour and Overheads 1,600 units @ 40	= ₹64,000
	₹1,44,000

(iv) Process 'A' Account

Particulars	Units	Amount	Particulars	Units	Amount
To Opening WIP	2,000	1,40,000*	By Normal Loss	2,000	40,000
Put & processed	38,000	14,80,000	By Abnormal Loss	1,000	72,000
Direct labour		3,59,000	By Process 'B' A/c	35,000	28,00,000
Overheads		10,77,000	By Closing WIP	2,000	1,44,000
	40,000	30,56,000		40,000	30,56,000

* Materials + Labour + Overheads = ₹(80,000 + 15,000 + 45,000) = ₹1,40,000

Normal Loss Account

To process 'A' A/c	2,000	40,000	By Bank A/c (Sale of scrap)	2,000	40,000
	2,000	40,000		2,000	40,000

Abnormal Loss Account

To process 'A' A/c	1,000	72,000	By Bank A/c (Sale of scrap)	1,000	20,000
			By Costing Profit and Loss A/c		52,000
	1,000	72,000		1,000	72,000

33.

(i) Statement of Equivalent Production

Input		Output		Material		Labour		Overheads	
				%	Units	%	Units	%	Units
Op. WIP	4,500	Complete and Transfer	39,500	100	39,500	100	39,500	100	39,500
Input	1,00,000	Normal Loss	55,000	-	-	-	-	-	-

	(1,00,000×55%)							
	Abnormal Loss	1,000	100	1,000	80	800	80	800
	Closing WIP	9,000	100	9,000	80	7,200	80	7,200
1,04,500		1,04,500		49,500		47,500		47,500

*100 kg sugarcane extracts only 45 litre of juice, thus, normal loss = 100 – 45 = 55%

(ii) Statement of Cost per Equivalent Unit

Particulars	Material	Labour	Overheads
Current Cost	5,00,000	2,00,000	6,00,000
Add: Cost of Opening WIP	50,000	15,000	45,000
Total	5,50,000	2,15,000	6,45,000
Equivalent Units	49,500	47,500	47,500
Cost per equivalent unit	11.111	4.526	13.579

Statement of apportionment of cost

Particulars	Element of Cost	Equivalent units	Cost per unit	Cost	Total Cost
Complete and transfer	Material	39,500	11.111	4,38,845	
	Labour	39,500	4.526	1,78,777	
	Overheads	39,500	13.579	5,36,370	11,54,032
Abnormal Loss	Material	1,000	11.111	11,000	
	Labour	800	4.526	3,621	
	Overheads	800	13.579	10,863	25,595
Closing WIP	Material	9,000	11.111	99,999	
	Labour	7,200	4.526	32,587	
	Overheads	7,200	13.579	97,769	2,30,355

(iii) Process - I Account

Particulars	Units	Amount	Particulars	Units	Amount
To Opening WIP	4,500	1,10,000	By Normal loss A/c	55,000	-
To Sugarcane	1,00,000	5,00,000	By Abnormal loss A/c	1,000	25,613
To Direct Labour	-	2,00,000	By Process - II A/c	39,500	11,54,032
To Overheads	-	6,00,000	By Closing WIP	9,000	2,30,355
	1,04,500	14,10,000		1,04,500	14,10,000

***Abnormal loss = 25,595 + 18 = ₹25,613**

₹18 are added due to approximation difference in total value

34.

(i) Statement of Equivalent Production

Input		Output		Material		Labour		Overheads	
				%	Units	%	Units	%	Units
Op. WIP	3,000	Op. WIP	3,000	100	3,000	100	3,000	100	3,000
Input	42,000	Introduced & Complete	33,000	100	33,000	100	33,000	100	33,000
		Transferred	36,000						
		Normal Loss (45,000×4%)	1,800	-	-	-	-	-	-
		Abnormal Loss (4,800 - 1,800)	3,000	100	3,000	70	2,100	70	2,100
		Closing WIP	4,200	100	4,200	50	2,100	50	2,100
	45,000		45,000		43,200		40,200		40,200

(ii) Statement of Cost per Equivalent Unit

Particulars	Material	Labour	Overheads
Current Cost	36,04,000	4,50,000	15,18,000
Add: Cost of Opening WIP	1,80,500	32,400	90,000
Less: Normal Scrap (1,800 × 62.50)	(1,12,500)	-	-
Total	36,72,000	4,82,400	16,08,000
Equivalent Units	43,200	40,200	40,200
Cost per equivalent unit	85	12	40

Statement of apportionment of cost

Particulars	Element of Cost	Equivalent units	Cost per unit	Cost	Total Cost
Opening WIP	Material	3,000	85	2,55,000	
	Labour	3,000	12	36,000	
	Overheads	3,000	40	1,20,000	4,11,000
Introduced & Comp.	Material	33,000	85	28,05,000	
	Labour	33,000	12	3,96,000	
	Overheads	33,000	40	13,20,000	45,21,000

Abnormal Loss	Material	3,000	85	2,55,000	
	Labour	2,100	12	25,200	
	Overheads	2,100	40	84,000	3,64,200
Closing WIP	Material	4,200	85	3,57,000	
	Labour	2,100	12	25,200	
	Overheads	2,100	40	84,000	4,66,200

(iii) Process - I Account

Particulars	Units	Amount	Particulars	Units	Amount
To Opening WIP	3,000	3,02,900	By Normal loss A/c	1,800	1,12,500
To Material	42,000	36,04,000	By Abnormal loss A/c	3,000	3,64,200
To Labour	-	4,50,000	By Process - II A/c (bal. fig)	36,000	49,32,000
To Overheads	-	15,18,000	By Closing WIP	4,200	4,66,200
	45,000	58,74,900		45,000	58,74,900

(iv) Normal Loss Account

Particulars	Units	Amount	Particulars	Units	Amount
To Process-I A/c	1,800	1,12,500	By Bank A/c	1,800	1,12,500
	1,800	1,12,500		1,800	1,12,500

(v) Abnormal Loss Account

Particulars	Units	Amount	Particulars	Units	Amount
To Process-I A/c	3,000	3,64,200	By Bank A/c (3,000 × 62.50)	3,000	1,87,500
			By Costing P&L A/c (Bal. fig.)	-	1,76,700
	3,000	3,64,200		3,000	3,64,200

35.

(i) Statement of Equivalent Production

Input		Output		Material		Overheads	
				%	Units	%	Units
Op. WIP	9,500	Op. WIP	9,500	100	9,500	100	9,500
Input	1,05,000	Introd. & Complete	73,500	100	73,500	100	73,500
		Transferred	83,000		83,000		83,000
		Normal Loss	10,500	-	-	-	-

	(1,05,000×10%)					
	Abnormal Loss (Bal. fig)	4,500	100	4,500	100	4,500
	Closing WIP	16,500	100	16,500	60	9,900
1,14,500		1,14,500		1,04,000		97,400

Statement of Cost per Equivalent Unit

Particulars	Material	Conversion Cost
Current Cost	3,34,500	2,53,100
Add: Cost of Opening WIP	29,500	14,750
Total	3,64,000	2,67,850
Equivalent Units	1,04,000	97,400
Cost per equivalent unit	3.50	2.75

Thus, cost per kg of Chemical G = 3.50 + 2.75 = ₹6.25

(ii) Statement of cost

Particulars	Element of Cost	Equivalent units	Cost per unit	Cost	Total Cost
Cost of Chemical G transferred	Material	83,000	3.50	2,90,500	
	Conversion cost	83,000	2.75	2,28,250	5,18,750
Abnormal Loss	Material	4,500	3.50	15,750	
	Conversion cost	4,500	2.75	12,375	28,125
Closing WIP	Material	16,500	3.50	57,750	
	Conversion cost	9,900	2.75	27,225	84,975

(iii) Statement of Evaluation of Offer

Particulars	Amount (₹)
Sale as chemical GK (60,000 × 1.20 × 10)	7,20,000
Less: Sale as chemical G (60,000 × 9)	5,40,000
Incremental sales revenue	1,80,000
Less: further processing cost (85,000 + 50,000)	1,35,000
Incremental Benefit	45,000

Since, there is incremental benefit in further processing, thus, it is recommended to continue Chemical 'G' in process II and sell as chemical 'GK'.

36. **Process 1 A/c**

Particulars	Kg.	Amount	Particulars	Kg.	Amount
To Material A	6,000	3,00,000	By Normal Loss	500	8,000
To Material B	4,000	4,00,000	By Abnormal loss	300	24,093
To Labour	-	21,500	(300×80.3105)		
To Production OHs $\left(\frac{92,000\times 430}{800}\right)$	-	49,450	By Process 2 (9,200×80.3105)	9,200	7,38,857
	10,000	7,70,950		10,000	7,70,950

Normal cost per unit = $\frac{7,70,950-8,000}{10,000-500}$ = Rs. 80.3105

Process 2 A/c

Particulars	Kg.	Amount	Particulars	Kg.	Amount
To Process 1	9,200	7,38,857	By Normal loss	1,000	—
To Material C	6,600	8,25,000	By WIP A/c	1,000	1,00,711
To Material D	4,200	3,15,000	By Packing Dept.	18,000	18,42,496
To Flavoring essence		3,300			
To labour		18,500			
To Overhead		42,550			
$\left(\frac{92,000\times 370}{800}\right)$	20,000	19,43,207		20,000	19,43,207

Abnormal Loss Account

Particulars	Kg.	Amount	Particulars	Kg.	Amount
To Process 1	300	24,093	By Bank	300	4,800
			By P & L A/c	-	19,293
	300	24,093		300	24,093

Note-1: **Statement of Equivalent Production**

Particulars	Output Units	Equivalent Production					
		Process-I	%	Mat. C & D	%	Lab & OHs	%
Normal wastage	1,000	-	-	-		-	
Packing Dept.	18,000	18,000	100	18,000	100	18,000	100
Closing WIP	1,000	1,000	100	1,000	100	1,000	50
	20,000	19,000		19,000		18,500	

Note-2: **Statement of Cost per unit**

Material	Total cost	Equivalent units	Cost per unit ₹
Process 1	7,38,857		
Material C	8,25,000		
Material D	3,15,000		
Flavouring essence	3,300		
	18,82,157	19,000	99.0609
Labour cost	18,500	18,500	1.0000
Production overhead	42,550	18,500	2.3000
			102.3609

Cost of units transferred to Packing Dept. = 18,000 units × ₹102.3609 = ₹18,42,496

Cost of WIP

Element	Equivalent units	Cost per unit	Total cost (₹)
Material	1,000	99.0609	99,061
Labour	500	1.0000	500
Overhead	500	2.3000	1,150
			1,00,711

37.

Process A Account

Particulars	Cost	Profit	Total	Particulars	Cost	Profit	Total
To Opening stock	5,000	-	5,000	By Process B A/c	28,800	7,200	21,600
To Direct material	9,000	-	9,000				
To Direct wages	5,000	-	5,000				
	19,000	-	19,000				
(-) Closing stock	(2,000)	-	(2,000)				
	17,000	-	17,000				
To Factory OHs	4,600	-	4,600				
	21,600	-	21,600				
To Profit	-	7,200	7,200				
	21,600	7,200	28,800		21,600	7,200	28,800

Process B Account

Particulars	Cost	Profit	Total	Particulars	Cost	Profit	Total
To Opening stock	4,500	1,000	5,500	By F. Stock A/c	41,550	20,125	61,675
To Process A A/c	21,600	7,200	28,800				
To Direct material	9,500	-	9,500				
To Direct wages	6,000	-	6,000				

Particulars	Cost	Profit	Total	Particulars	Cost	Profit	Total
	41,600	8,200	49,800				
(-) Closing stock	(2,080)	(410)	(2,490)				
	39,520	7,790	47,310				
To Factory OHs	2,030	-	2,030				
	41,550	7,790	49,340				
To Profit	-	12,335	12,335				
	41,550	20,125	61,675		41,550	20,125	61,675

Profit element in closing stock = $\frac{8,200}{49,800} \times 2,490 = ₹410$

Finished Stock Account

Particulars	Cost	Profit	Total	Particulars	Cost	Profit	Total
To Opening stock	6,000	4,000	10,000	By Costing P&L A/c	44,233	30,767	75,000
To Process B A/c	41,550	20,125	61,675				
	47,550	24,125	71,675				
(-) Closing stock	(3,317)	(1,683)	(5,000)				
	44,233	22,442	66,675				
To Profit (Bal. fig)	-	8,325	8,325				
	44,233	30,767	75,000		44,233	30,767	75,000

Profit element in closing stock = $\frac{24,125}{71,675} \times 5,000 = ₹1,683.$

38. **Process A Account**

Particulars	₹	Particulars	₹
To Material	40,000	To Transfer to Process B A/c	1,20,000
To Labour	40,000	(96,000 ÷ 80%)	
To Overheads	16,000		
	96,000		
To Profit (1,20,000 × 20%)	24,000		
	1,20,000		1,20,000

Process B Account

Particulars	₹	Particulars	₹
To Process A A/c	1,20,000	To Transfer to Process B A/c	2,88,000
To Labour	56,000	(2,16,000 ÷ 75%)	
To Overheads	40,000		
	2,16,000		
To Profit (2,88,000 × 25%)	72,000		
	2,88,000		2,88,000

Statement of Total Profit

Particulars	₹
Profit from Process A	24,000
Profit from Process B	72,000
Profit on sales (4,00,000 – 2,88,000)	1,12,000
Total Profit	2,08,000

39. Abnormal gain units = 7,600 – (8,000 – 800) = 400 abnormal gain

Abnormal gain = $\left[\frac{40,000-(800\times5)}{7,200}\right]\times 400\,\text{units} = ₹2,000.$

40. (i) (d)

Inflow into process	Litres	Outflow from process	Litres
Opening WIP	500	Transferred to finished goods	3,400
Quantity introduced (Balancing figure)	3,800	Total loss	800
		Closing WIP	100
	4,300		4,300

(ii) (a)

Total loss	800 litres
Normal loss (10% of fresh input i.e. 3,800)	380 litres
Abnormal loss	420 litres

(iii) B

Calculation of Equivalent production units

Input Details	Units	Output Particulars	Units	Equivalent Production					
				Material		Labour		Overheads	
				%	Units	%	Units	%	Units
Open-ing WIP	500	From Opening WIP	500	-	-	20	100	40	200
Fresh inputs	3,800	From fresh units	2900	100	2900	100	2900	100	2900
		Normal loss	380	-		-			
		Closing WIP	100	100	100	20	20	10	10
		Abnormal	420	100	420	100	420	100	420
	4,300		4,300		3,420		3,440		3,530

Value of raw materials introduced during the month

	Equivalent units	Cost per EU (₹)	Total cost (₹)
Total value of raw material	3420	300	10,26,000
Add: Scrap value of normal	380	20	7,600
loss			
Value of raw material introduced			10,33,600

(iv) A

Value of labour and overhead in closing Work in process

Cost elements	Equivalent units	Cost per EU (₹)	Total cost (₹)
Labour	20	200	4,000
Overheads	10	160	1,600

(v) C

Value of output transferred to finished goods

Output transferred (Units) × Equivalent cost per unit

3,400 Litres × ₹660 – ₹22,44,000.

❑❑❑

11 CHAPTER

Joint and By-Product

Joint Products	• It represents two or more products of almost equal importance which are produced in natural proportions simultaneously from the same material in the same process. • These products may be saleable without further processing or after further processing. • For example, in refining crude petroleum, gasoline, oil, fuel, lubricants, paraffin, etc. produced are all joint products.
Co-Products	• It represents two or more products which are contemporary but are not necessarily produced in natural proportions from the same material in the same process. • For example, either chair or table can be produced from same wood.
By-Product	• It refers to incidental waste, arising during the course of manufacture, which has a commercial name and value. • In other words, it refers to secondary or subsidiary product incidentally arising during the manufacturing process. • It may be further processed to increase their realizable value. • For example, molasses arising in the manufacture of sugar, husk arising in the rice mill while production of rice.
Split of Point	• It is a point in a production process where joint products emerging from the process gets separately identifiable. • Cost incurred upto split of point is known as joint costs and such costs needs to be borne jointly by the products emerging from the common process. • Any cost incurred after split of point is a product specific cost and to be borne by the product concerned.
Point of distinction between Joint Products and By-Products	• Joint product are the products of equal economic importance, while the by-product are of lesser importance • Joint product are produced in the same process, whereas by-products are produced from the scrap or the discarded materials of the main product • Joint products are not produced incidentally, but by-products emerge incidentally also.

Accounting Treatment of By-Product	• **When they are of small total value** ➢ The sale value of the by-product may be credited to the P&L Account as miscellaneous income and no credit be given in the cost accounts. ➢ The sale proceeds of the by-product may be treated as deduction from the total costs. • **When they are of considerable total value** ➢ In this case by-products may be regarded as joint products. ➢ The costs incurred upto the point of separation should be apportioned over by-products and joint products by using a logical basis. • **When they require further processing** ➢ In this case, the net realizable value of the by-product at the split–off point may be arrived at by subtracting the further processing cost from the realizable value of by-products. ➢ If the total sales value of by-products at split-off point is small, it may be treated as per the provisions discussed under (i) above. ➢ If the amount realized from the sale of by-products is considerable, it may be treated as discussed under (ii) above.
Methods of Apportionment of Joint Cost to Joint Products	• Physical Unit Method • Net Realisable Value • Using Technical Estimates • Market Value at Point of Separation • Market Value after Further Processing • Average Unit Cost Method • Contribution Margin Method • Reverse Cost Method
Physical unit Method	• Under this method, joint costs are apportioned on the basis of physical volume of the joint products at the split-off point. • Any processing loss is also apportioned over the products on the same basis. • This method is suitable where the physical units of joint products are same.
Net Realizable Value Method (NRV)	• Under this method, joint costs are apportioned in the ratio of net realizable values of the joint products at the separation point. • NRV = Estimated final sales value of output – S&D expenses – Further Processing Cost • This method is suitable where all the joint products are subject to further processing, further processing costs after separation point are incurred disproportionately and market value of all the joint products at separation point are not available.
Technical Estimates	• This method uses technical estimates to apportion the joint costs over the joint products. • It is used when the result obtained from other methods does not match with the resources consumed by joint products or the realizable value fo the joint products are not readily available.

Market Value at Separation Point Method	• Under this method, joint costs are apportioned in the ratio of market value of the joint products at the separation point. • This method is suitable where further processing costs after separation point are incurred disproportionately or where joint products are not subject to further processing. • This method is not applicable where the market values of the joint products at separation point are not available.
Market Value After Further Processing	• Under this method, joint costs are apportioned in the ratio of market value of the joint product after further processing. • This method is suitable where all the joint products are subject to further processing and further processing costs after separation point are incurred proportionately.
Average Unit Cost Method	• Under this method, joint costs are apportioned on the basis of average cost per unit which is obtained by dividing total joint costs by total number of units of joint products produced. • The effect of application of this method is that all joint products will have uniform cost per unit and customers of high quality items are benefited because they have to pay less price on their purchase.
Contribution Margin Method	• Under this method, joint costs are segregated into two parts viz. variable and fixed. • The variable costs are apportioned over the joint products on the basis of units produced (average method) or physical quantities. • If the products are further processed, then all variable cost incurred to be added to the variable cost determined earlier. • Then contribution is calculated by deducting variable cost from their respective sales values. • The fixed costs are then apportioned over the joint products on the basis of contribution ratios.
Reverse Cost Method	• Under this method, joint costs are apportioned in the ratio of joint cost values of the joint products at the separation point. • Joint Cost of each product = Estimated Sale Value – Estimate Profit – Estimated S&D expenses – Further processing cost
Methods of Apportionment of Joint Cost to by-Products	• Net Realisable Value Method • Standard Cost in Technical Estimates • Comparative Price • Re-use Basis

PRACTICAL QUESTIONS

1. Calculate the estimated cost of production of by-products X and Y at the point of separation from the main product:

	By-product X	By-product Y
	₹	₹
Selling price per unit	12	24
Cost per unit after separation from main product	3	5
Units produced	500	200

Selling expenses amount to 25% of Total Works Cost – i.e. including both pre-separation and post-separation works cost. Selling prices are arrived at by adding 20% to Total Cost – i.e., the sum of works cost and selling expenses.

Ans. ₹2,500; ₹2,200

2. A factory is engaged in the production of a chemical X and in the course of its manufacture a by-product Y is produced, which after a separate process has a commercial value. For the month of March, the following are summarized cost data:

	Joint Expenses	Separate Expenses	
	(₹)	X(₹)	Y(₹)
Materials	19,200	7,360	780
Labour	11,700	7,680	2,642
Overheads	3,450	1,500	544

The output of the month was 142 tonnes of X and 49 tonnes of Y. The selling price of Y averaged ₹280 per tonne. Assuming the profit on Y is estimated at 50% of selling price, calculate the cost of X per tonne.

Ans. ₹47,996

3. Two products P and Q are obtained in a crude form and require further processing at a cost of ₹5 for P and ₹4 for Q per unit before sale. Assuming a net margin of 25 per cent on cost, their sale prices are fixed at ₹13.75 and ₹8.75 per unit respectively. During the period, the joint cost was ₹88,000 and the output were:

P 8,000 units

Q 6,000 units

Ascertain the joint cost per unit.

Ans. ₹8; ₹4

4. A factory producing article P also produces a by-product Q which is further processed into finished product. The joint costs of manufacture are given below: **[RTP Nov 2023]**

	₹
Material	5,000
Labour	3,000
Overheads	2,000
	10,000

Subsequent costs are given below:

	P	Q
Material	₹3,000	₹1,500
Labour	1,400	1,000
Overheads	600	500
	5,000	3,000

Selling prices are: P – ₹16,000 and Q – ₹8,000

Estimated profits margin on selling prices are 25% for P and 20% for Q.

Assume that selling and distribution expenses are in proportion of sales prices. Show how you would apportion joint costs of manufacture and prepare a statement showing cost of production of P and Q. Also prepare Production Accounts.

Ans. ₹6,733; ₹3,267

5. The SK Oil company purchase crude vegetable oil. It does refining of the same. The refining process results in four products at the split off point: M, N, O & P.

Product O is fully processed at the split off point. Product M, N, & P can be individually further refined into 'Super M', 'Super N' and 'Super P'. In the most recent month (October), the output at split off point was:

Product M	3,00,000 gallons
Product N	1,00,000 gallons
Product O	50,000 gallons
Product P	50,000 gallons

The joint cost of the purchasing the crude vegetable oil and Processing it were ₹40,00,000. SK had no beginning or ending inventories. Sales of Product O in October were ₹20,00,000. Total output of products M, N and P was further refined and then sold. Data related to October are as follows:

Product	Further processing cost to make super products	Sales
Super M	₹80,00,000	₹1,20,00,000
Super N	₹32,00,000	₹40,00,000
Super P	₹36,00,000	₹48,00,000

SK had the option of selling products M, N and P at the split off point. This alternative would have yielded the following sales for the October, production:

Product M	₹20,00,000
Product N	₹12,00,000
Product P	₹28,00,000

You are required to answer:

(a) How the joint cost of ₹40,00,000 would be allocated between each product under the following methods

(i) Sales value at split off point

(ii) Physical output (gallon)

(iii) Estimated net realizable value

(b) Could SK have increased its October operating profits by making different decisions about the further refining of product M, N or P? Show the effect of any change you recommend on operating profits.

Ans. (a) ₹in lakhs (i)₹10; ₹6; ₹10; ₹14; (ii) ₹24; ₹8; ₹4; ₹4; (iii) ₹20; ₹4; 10; ₹6;

6. Find out the cost of Joint products A, B and C using average unit cost method from the following data: **[SM]**

(a) Pre-separation joint cost ₹60,000

(b) Production data:

Products	Units produced
A	500
B	200
C	300
	1,000

Ans. ₹30,000; ₹12,000; ₹18,000

7. A Factory produces two products, 'A' and 'B' from a single process. The joint processing costs during a particular month are: **[Nov 2019]**

Direct material	₹30,000
Direct labour	₹9,600
Variable Overheads	₹12,000
Fixed Overheads	₹32,000

Sales: A – 100 units @ ₹600 per unit; B – 120 units @ ₹200 per unit.

Apportion joint costs on the basis of:

(i) Physical Quantity of each product.

(ii) Contribution Margin method, and

(iii) Determine Profit or Loss under both the methods.

Ans. (i) ₹38,000; ₹45,600; (ii) ₹55,455; ₹28,145

8. From a single raw material, a chemical company produces three products A, B and C. Product A is considered to be a by-product and products B and C are treated as major joint products. In

process I, by-product A is obtained and the remaining output passes to process II where products B and C are obtained.

During January, the cost of materials consumed was ₹3,600 and operating costs were:

Process I: ₹6,000 and Process II: ₹7,500

Work-in-progress was negligible at both the beginning and end of the month. Production and sales data for the month is given below:

Product	Production	Sales
A	6,000 litres	3,000 litres at 5 paise per litre
B	9,000 kgs	7,500 kgs at ₹2 per kg
C	2,500 kgs	1,500 kgs at ₹4.80 per kg

Stocks as on 1st Jan were:

Product	Quantity	Rate
A	600 litres	5 paise per litre
B	750 kgs	₹1.5 per kg
C	50 kgs	₹3.75 per kg

You are required to prepare statement showing: (a) the value of the stock of each product as on 31st January, employing market price for A and apportioning the remaining cost between B and C according to the sales value of the output and (b) gross profit for January.

Ans. (a) ₹180; ₹2,520; ₹2,822.40; (b) ₹6,315; ₹3,114.90

9. A Company produces two joint products P and Q in 70:30 ratio from basic raw materials in department A. The input output ratio of department A is 100:85. Product P can be sold at the split off stage or can be processed further at department B and sold as product AR. The input output ratio is 100:90 of department B. The department B is created to process product P only and to make it product AR.

The selling prices per kg are as under:

Product P	₹85
Product Q	₹290
Product AR	₹115

The production will be taken up in the next month.

Raw materials 8,00,000 kgs

Purchase price ₹80 per kg

	Deptt. A (₹Lacs)	Deptt. B (₹Lacs)
Direct materials	35.00	5.00
Direct labour	30.00	9.00
Variable overhead	45.00	18.00
Fixed overheads	40.00	32.00
Total	150.00	64.00
Selling Expenses	**₹in lacs**	
Product P	24.60	
Product Q	21.60	
Product AR	16.80	

Required:

(i) Prepare a statement showing the apportionment of joint costs if Joint Costs are apportioned in the proportion of NRV at Split-off point.

(ii) State whether it is advisable to produce product AR or not.

Ans. (i) ₹316 lakh; ₹474 lakh; (ii) Yes recommended

10. SK Ltd. produces three joint products. In the period just ended costs of production totalled ₹5,09,640. Output from the process during the period was:

Product W	2,76,000 Kilos
Product X	3,34,000 Kilos
Product Y	1,34,000 Kilos

There was no opening stock of the three products. Products W and X are sold in this stage. Product Y is subjected to further processing. Sales of products W and X during the period were:

Product W	2,55,000 Kilos at ₹0.945 per kilo
Product X	3,12,000 Kilos at ₹0.890 per kilo

1,28,000 kilos of product Y were further processed during the period. The balance of the period production of the three products W, X and Z remained in stock at the end of the period. The value of closing stock of individual products is calculated by apportioning costs according to weight of output.

The additional costs in the period of further processing product Y, which is converted into product Z, were:

Direct Labour	₹10,850
Production overhead	₹7,070

96,000 Kilos of product Z were produced from the 1,28,000 kilos of product Y. A by-product BP is also produced which can be sold for ₹0.12 per kilo. 8,000 kilos of BP were produced and sold in the period.

Sales of product Z during the period were 94,000 kilos, with total revenue of ₹1,00,110. Opening stock of product Z was 8,000 Kilos @ ₹1.08 per kg. The FIFO method is used for pricing transfers of product Z to cost of sales. Selling and distribution costs are charged to all main products when sold, at 10% revenue.

Required:

(a) Prepare a profit and loss statement for the period, identifying separately the profitability of each of the three main products.

(b) SK Ltd. has now received an offer from another company to purchase the total output of product Y (i.e. before further processing) for ₹0.62 per Kilo. Calculate the viability of this alternative. Consider selling & distribution overheads as fixed expenses for making your evaluation.

Ans. (a) ₹42,202; ₹36,192; -₹12,281; (b) Don't accept the proposal.

PRACTICE QUESTIONS

11. SK Ltd. produces two main products and a by-product out of a joint process. The ratio of output quantities to input quantities of direct material used in the joint process remains consistent on yearly basis. Company has employed the physical volume method to allocate joint production costs to the main products. The net realizable value of the by-product is used to reduce the joint production costs before the joint costs are allocated to the main products. Details of company's operation are given in the table below. During the month, company incurred joint production costs of ₹10,00,000. The main products are not marketable at the split off point and thus have to be processed further. **[SM]**

Particulars	Product A	Product B	Product C
Monthly output in kg	60,000	1,20,000	50,000
Selling price per kg	₹50	₹30	₹5
Process costs	₹2,00,000	₹3,00,000	

Find out the amount of joint cost that SK Ltd. would allocate to the product-B by using the physical volume method to allocate join production costs?

Ans. ₹5,00,000

12. A Factory is engaged in the production of chemical Bomex and in the course of its manufacture a by-product Cromex is produced which after further processing has a commercial value. For the month of April 2019 the following are the summarized cost data: **[May 2019]**

	Joint Expenses	Separate Expenses	
	₹	Bomex (₹)	Cromex (₹)
Materials	1,00,000	6,000	4,000
Labour	50,000	20,000	18,000
Overheads	30,000	10,000	6,000
Selling price per unit		100	40
Estimated profit per unit			5

	Units	Units
No. of units produced	2,000	2,000

The factory uses net realizable value method for apportionment of joint cost to by-products. You are required to prepare statements showing:

(i) the joint cost allocable to Cromex

(ii) the product-wise and overall profitability of the factory for April 2019.

Ans. (i) ₹42,000; (ii) ₹26,000; ₹10,000.

13. ASR Limited produces Product 'L' and gets a by-Product 'M' out of a joint process. The net realizable value fo the by-product is used to reduce the joint production costs before the joint costs are allocated to the main product. During the month of October 2022, company incurred joint production costs of ₹4,00,000. The main product 'L' is not marketable at the split off point. Thus, it has to be processed further. Details of company's operation are as under: **[Nov 2022]**

Particulars	Product L	By-Product M
Production (units)	10,000	200
Selling price per kg	₹45	₹5
Further processing cost	₹1,01,000	-

You are required to find out:

(i) Profit earned from Product 'L'

(ii) Selling price per kg of product 'L', if the company wishes to earn a profit of ₹1,00,000 from the above production.

Ans. (i) – ₹50,000; (ii) ₹60.

14. A coke manufacturing company produces the following products by using 5,000 tons of coal @ ₹1,100 per ton into a common process. **[SM]**

Coke	3,500 tons
Tar	1,200 tons
Sulphate of ammonia	52 tons
Benzol	48 tons

Prepare a statement apportioning the joint cost amongst the products on the basis of the physical unit method.

Ans. ₹40,10,600; ₹13,75,000; ₹59,400; ₹55,000.

15. Find out the cost of join products A and B using contribution margin method from the following data: **[SM]**

Sales: A: 100 kg @ ₹60 per kg
B: 120 kg @ ₹30 per kg

Joint costs
Marginal costs ₹4,400
Fixed costs ₹3,900

Ans. ₹5,000; ₹3,300.

16. OPR Ltd. purchases crude vegetable oil. It does refining of the same. The refining process results in four products at the split-off point – S, P, N and A. Product 'A' is fully processed at the split-off point. Product S, P and N can be individually further refined into SK, PM, and NL respectively. The joint cost of purchasing the crude vegetable oil and processing it were ₹40,000. Other details are as follows: **[SM, July 2021]**

Product	Further Processing costs (₹)	Sales at split-off point (₹)	Sales after further processing (₹)
S	80,000	20,000	1,20,000
P	32,000	12,000	40,000
N	36,000	28,000	48,000
A	-	20,000	-

You are required to identify the products which can be further processed for maximizing profits and make suitable suggestions.

Ans. ₹20,000; -₹4,000; -₹16,000.

17. In Oil Mill four products emerges from a refining process. The total cost of input during the quarter ending March 2018 is ₹1,48,000. The output, sales and additional processing costs are as under:

[RTP Nov 2019]

Product	Output in Litres	Additional processing Cost after split off point (₹)	Sales Vale (₹)
ACH	8,000	43,000	172,500
BCH	4,000	9,000	15,000
CSH	2,000	-	6,000
DSH	4,000	1,500	45,000

In case these products were disposed of at split off point that is before further processing, the selling prices would have been:

ACH	BCH	CSH	DSH
₹15.00	₹6.00	₹3.00	₹7.50

Prepare a statement of profitability assuming that joint costs are allocated in ratio of sales value at split off point in the following cases:

(a) If the products are sold after further processing is carries out in the mills

(b) If they are sold at the split off point

Ans. (a) Total profit = ₹37,000; (b) Total profit = ₹32,000.

18. SK Ltd. produces 2,00,000, 30,000, 25,000, 20,000 and 75,000 units of its five products A, B, C, D and E respectively in a manufacturing process and sells them at ₹17, ₹13, ₹8, ₹10 and ₹14 per unit. Except product D remaining products can be further processed and then can be sold at ₹25, ₹17, ₹12 and ₹20 per unit in case of A, B, C and E respectively. **[SM, RTP May 2023]**

Raw material costs ₹35,90,000 and other manufacturing expenses cost ₹5,47,000 in the manufacturing process which are absorbed on the products on the basis of their 'Net Realisable Value'. The further processing costs of A, B, C and E are ₹12,50,000, ₹1,50,000, ₹50,000 and ₹1,50,000 respectively. Fixed costs are ₹4,73,000.

You are required to prepare the following in respect of the coming year:

(a) Statement showing income forecast of the company assuming that none of its products are to be further processed

(b) Statement showing income forecast of the company assuming that products A, B, C and E are to be processed further.

(c) Can you suggest any other production plan whereby the company can maximize the profits? If yes, then submit a statement showing income forecast arising out of adoption of that plan.

Ans. (a) Profit ₹6,30,000; (b) Profit ₹13,00,000; (c) Profit ₹13,30,000.

19. A company produces two joint product X and Y, from the same basic materials. The processing is completed in three departments. **[RTP Dec 2021]**

Materials are mixed in department I. At the end of this process X and Y get separated. After separation X is completed in the department II and Y is finished in department III. During a period 2,00,000 kgs of raw material were processed in department I, at a total cost of ₹8,75,000 and the resultant 60% becomes X and 30% becomes Y and 10% normally lost in processing.

In department II 1/6 of the quantity received from department I is lost in processing. X is further processed in department II at a cost of ₹1,80,000.

In department III further new material added to the material received from department I and weight mixture is doubled, there is no quantity loss in the department and further processing cost (with material cost) is ₹1,50,000.

The details of sales during the year:

	Product X	Product Y
Quantity sold (kgs)	90,000	1,15,000
Sales price per kg (₹)	10	4

There were no opening stocks. If these products sold at split-off-point, the selling price of X and Y would be ₹8 and ₹4 per kg respectively.

Required:

(a) Prepare a statement showing the apportionment of joint cost to X and Y in proportion of sales value at split off point.

(b) Prepare a statement showing the cost per kg of each product indicating joint cost, processing cost and total cost separately.

(c) Prepare a statement showing the product wise profit for the year

(d) On the basis of profits before and after further processing of product X and Y, give your comment that products should be further processed or not.

Ans. (a) ₹7,00,000; ₹1,75,000; (b) ₹8.80; ₹2.708; (c) ₹1,08,000; ₹1,48,540.

20. SK Ltd. is engaged in the production of Buttermilk, Butter and Ghee. It purchases processed cream and let it through the process of churning until it separates into buttermilk and butter. For the month of May, 2021, SK Ltd. purchased 50 kilolitre processed cream @ ₹100 per 1,000 ml. Conversion cost of ₹1,00,000 were incurred up-to the split off point, where two saleable products were produced i.e. buttermilk and butter. Butter can be further processed into Ghee. **[SM]**

The May, 2021 production and sales information is as follows:

Products	Production (in Kilolitre/tonne)	Sales Quantity (in Kilootire/tonne)	Selling price per litre/kg (₹)
Buttermilk	28	28	30
Butter	20	-	-
Ghee	16	16	480

All 20 tonne of butter were further processed at an incremental cost of ₹1,20,000 to yield 16 Kilolitre of Ghee. There was no opening or closing inventories of buttermilk, butter or ghee in May, 2021.

Required:

(i) Show how joint cost would be apportioned between Buttermilk and Butter under estimated net realizable value method.

(ii) MP Ltd. offers to purchase 20 tonne of butter in June at ₹360 per kg. In case SK Ltd. accepts this offer, no Ghee would be produced in June. Suggest whether SK Ltd. shall accept the offer affecting its operating income or further process butter to make Ghee itself?

Ans. (i) ₹5,10,000; ₹45,90,000; (ii) Not to accept offer.

21. RST Limited produces three joint products X, Y and Z. The products are processed further. Pre-separation costs are apportioned on the basis of weight of output of each joint product. The following data are provided for the month of April, 2022. **[SM, May 2022]**

Cost incurred up to separation point: ₹10,000

	Product X	Product Y	Product Z
Output (in Litre)	100	70	80
	₹	₹	₹
Cost incurred after separation point	2,000	1,200	800
Selling price per litre:			
After further processing	50	80	60
At pre-separation point (estimated)	25	70	45

You are required to:

(i) Prepare a statement showing profit or loss made by each product after further processing using the presently adopted method of apportionment of pre-separation cost.

(ii) Advise the management whether, on purely financial consideration, the three products are to be processed further or not.

Ans. (i) -₹1,000; ₹1,600; ₹800.

22. SK manufacturing company uses joint production process that produces three products at the split off point. Joint production costs during September were ₹8,40,000. Product information for September was as follows: **[SM, RTP Nov 2022]**

Particulars	Product A	Product B	Product C
Units produced	1,500	3,000	4,500
Units sold	2,000	6,000	7,500
Sales Prices:			
At the split-off	₹100		
After further processing	₹150	₹175	₹50
Costs to process after split-off	₹1,50,000	₹1,50,000	₹1,50,000

Assume that product C is treated as a by-product and the company accounts for the by-product at net realizable value as a reduction of Joint cost. Assume also that product B & C must be processed further before they can be sold. Find out the total cost of Product A in September if joint cost allocation is based on net realizable values?

23. A company's plant processes 6,750 units of a raw material in a month to produce two products 'M' and 'N'. The process yield is as under: **[Nov 2020]**

Product M	80%
Product N	12%
Process loss	8%

The cost of raw material is ₹80 per unit.

Processing cost is ₹2,25,000 of which labour cost is accounted for 66%. Labour is chargeable to products 'M' and 'N' in the ratio of 100:80.

Prepare a comprehensive cost statement for each product showing:

(i) Apportionment of joint cost among products 'M' and 'N' and

(ii) Total cost of the products 'M' and 'N'.

Ans. (i) ₹6,18,587; ₹1,46,413; (ii) ₹6,18,587; ₹1,46,413.

24. A company processes a raw material in its Department 1 to produce three products, viz. A, B and X at the same split-off stage. During a period 1,80,000 kgs of raw materials were processed in Department 1 at a total cost of ₹12,88,000 and the resultant output of A, B and X were 18,000 kgs, 10,000 kgs and 54,000 kgs respectively. a and B were further processed in Department 2 at a cost of ₹1,80,000 and ₹1,50,000 respectively. **[Similar RTP May 2019 & May 2018]**

X was further processed in Department 3 at a cost of ₹1,08,000. There is no waste in further processing. The details of sales effected during the, period were as under:

	A	B	X
Quantity Sold (Kgs)	17,000	5,000	44,000
Sales Value (₹)	12,24,000	2,50,000	7,92,000

There were no opening stocks. If these products were sold at split-off stage, the selling prices of A, B and X would have been ₹50, ₹40 and ₹10 per kg respectively.

Required:

(a) Prepare a statement showing the apportionment of joint costs to A, B and X.

(b) Present a statement showing the cost per kg of each product indicating joint cost, further processing cost and total cost separately.

(c) Prepare a statement showing the product wise and total profit for the period

(d) State with supporting calculations as to whether any or all the products should be further processed or not.

Ans. (a) ₹6,30,000; ₹2,80,000; ₹3,78,000; (b) ₹45; ₹43; ₹9; (c) ₹8,90,000.

25. Three products X, Y and Z alongwith a byproduct B are obtained again in a crude state which require further processing at a cost of ₹5 for X; ₹4 for Y; and ₹2.50 for Z per unit before sale. The byproduct is however saleable as such to a nearby factory. The selling prices for the three main products and byproduct, assuming they should yield a net margin of 25% of cost, are fixed at ₹13.75, ₹8.75 and ₹7.50 and ₹1.00 respectively – all per unit quantity sold. **[MTP Nov 2018]**

During a period, the joint input cost including the material cost was ₹90,800 and the respective outputs were:

X	8,000 units
Y	6,000 units
Z	4,000 units
B	1,000 units

By-product should be credited to joint cost and only the net joint costs are to be allocated to the main products. Calculate the joint cost per unit of each product and the margin available as a percentage on cost.

Ans. 17.02%; 18.56%; 16.46%.

26. A company manufactures one main product (M1) and two by-products B1 and B2 for the month of January 2013, following details are available. Total Cost upto Separation Point ₹2,12,400.

[MTP Nov 2018]

	M1	B1	B2
Cost after separation	-	₹35,000	₹24,000
No. Of units produced	4,000	1,800	3,000
Selling price per unit	₹100	₹40	₹30
Estimated net profit as percentage to sales value	-	20%	30%
Estimated selling expenses as percentage to sales value	20%	15%	15%

There are no beginning or closing inventories.

Prepare statement showing:

(a) Allocation of joint costs; and

(b) Product wise and overall profitability of the company for January 2013.

Ans. (a) ₹11,800; ₹25,500; (b) ₹1,86,300.

27. Mayura Chemicals Ltd. buys a particular raw material at ₹8 per litre. At the end of the processing in Department-1, this raw material splits-off into products X, Y and Z. Product X is sold at the split-off point, with no further processing. Products Y and Z require further processing before they can be sold. Product Y is processed in Department-2, and Product Z is processed in Department-3. Following is a summary of the costs and other related data for the year 2019-20: **[Jan 2021]**

Particulars	Department		
	1	2	3
Cost of Raw Material	₹4,80,000	-	-
Direct Labour	₹70,000	₹4,50,000	₹6,50,000
Manufacturing Overhead	₹48,000	₹2,10,000	₹4,50,000
	Products		
	X	**Y**	**Z**
Sales (litres)	10,000	15,000	22,500
Closing inventory (litres)	5,000	-	7,500
Sale price per litre (₹)	30	64	50

There were no opening and closing inventories of basic raw materials at the beginning as well as at the end of the year. All finished goods inventory in litres was complete as to processing. The company uses the Net-realizable value method of allocating join costs.

You are required to prepare:

(i) Schedule showing the allocation of joint costs

(ii) Calculate the cost of goods sold of each product and the cost of each item in Inventory

(iii) A comparative statement of Gross Profit

Ans. (i) ₹2,34,000; ₹1,56,000; ₹2,08,000; (ii) ₹1,56,000; ₹8,16,000; ₹9,81,000; (iii) ₹4,32,000.

28. SK Chemicals purchases salt and processes it into more refined products such as Caustic Soda, Chlorine and PVC. In the month of July, Inorganic Chemicals purchased salt for ₹40,000. Conversion costs of ₹60,000 were incurred upto the split off point, at which time two saleable products were produced. Chlorine can be further processed into PVC. The July production and sales information is as follows: **[SM]**

	Production (tonnes)	Sales Quantity (tonnes)	Selling Price (per tonne)
Caustic soda	1,200	1,200	₹50
Chlorine	800	-	-
PVC	500	500	₹200

All 800 tonnes of Chlorine were further processed, at an incremental cost of ₹20,000 to yield 500 tonnes of PVC. There were no beginning or ending inventories of Caustic soda, Chlorine or PVC. There is active market for Chlorine. Inorganic Chemicals could have sold all its July production of Chlorine at ₹75 per tonne.

Required:

(a) To calculate how joint cost of ₹1,00,000 would be apportioned between Caustic Soda and Chlorine under each of following methods:
  (i) Sales value at split off,
  (ii) physical measure (method) and
  (iii) Estimated net realizable value

(b) MP Products offers to purchase 800 tonnes of Chlorine in august at ₹75 per tonne. This sale of chlorine would mean that no PVC would be produced in August. How the acceptance of this offer for the month of August would affect operating income?

Ans. (a) (i) ₹50,00; ₹50,000; (ii) ₹60,000; ₹40,000; (iii) ₹42,857; ₹57,143; (b) loss ₹20,000.

SOLUTION OF PRACTICE QUESTIONS

11. Net joint cost to be allocated = Joint cost – Realisable value of by-product

= 10,00,000 – (50,000 × 5) = ₹7,50,000

Share of joint cost of Product B on basis of physical unit method

$$= \frac{\text{Physical quantity of B}}{\text{Total quantity}} \times \text{Net Joint cost} = \frac{1,20,000}{1,80,000} \times 7,50,000 = ₹5,00,000$$

12.

(i) Statement showing Joint Cost Allocation to 'Cromex'

Particulars	Cromex (₹)
Sales (₹40 × 2,000 units)	80,000
Less: Post split off costs (4,000 + 18,000 + 6,000)	(28,000)
Less: Estimated profit (₹5 × 2,000)	(10,000)
Joint Cost Allocable	**42,000**

(ii) Statement showing product wise and Overall Profitability

Particulars	Bomex (₹)	Cromex (₹)	Total (₹)
Sales	2,00,000	80,000	2,80,000
Less: Share in Joint Expenses	(1,38,000)*	(42,000)	(1,80,000)
Less: Post split off costs	(36,000)	(28,000)	(64,000)
Profit	26,000	10,000	36,000

*This is a balancing figure i.e. 1,80,000 – 42,000 = 1,38,000

13.

(i) Calculation of profit on product 'L'

Particulars	₹
Sales value	4,50,000
Less: Further processing cost	(1,01,000)
	3,49,000
Less: Joint production cost [4,00,000 – (200 × 5)]	(3,99,000)
Loss	(50,000)

(ii) Desired selling price = $\frac{\text{Total cost+Desired profit}}{\text{Units}} = \frac{3,99,000+1,01,000+1,00,000}{10,000}$

= ₹60 per kg

14. Wastage = Input – Output = 5,000 – (3,500 + 1,200 + 52 + 48) = 200

*Wastage will be distributed over four products in ratio of output and will be added with output to get input units.

Particulars	Coke	Tar	Sulphate of Amonia	Benzole
Output	3,500	1,200	52	48
Wastage*	146	50	2	2
Input	3,646	1,250	54	50
Share of Joint Cost @1,100 per ton	40,10,600	13,75,000	59,400	55,000

15.

Statement of Joint Cost

Particulars	Product A	Product B
Marginal Cost	2,000	2,400
(4,400 in 100:20 i.e. quantity ratio)		
Fixed Cost (w.n. – 1)	3,000	900
Share of Joint Cost	5,000	3,300

Working Note-1

Statement of Distribution of Fixed Cost

Particulars	Product A	Product B
Sales	100×60 = 6,000	120×30 = 3,600
(-) Variable Cost	2,000	2,400
Contribution	4,000	1,200
Share of Fixed Cost (3,900 in 40:12)	3,000	900

16.

Statement of Incremental Profit/(Loss)

Particulars	Product S	Product P	Product N
Sale after further processing	1,20,000	40,000	48,000
Less: Sale at split-off point	20,000	12,000	28,000
Incremental sale	1,00,000	28,000	20,000
Less: further processing cost	80,000	32,000	36,000
Incremental profit/(loss)	20,000	(4,000)	(16,000)

Thus, it is recommended to further process Product S and Product P, N and A should be sold at split off point.

17.

Statement of Cost

Particulars	Product ACH	Product BCH	Product CSH	Product DSH
Sale value at split off	8,000×15=1,20,000	4,000×6=24,000	2,000×3=6,000	4,000×7.50=30,000
Share of Joint Cost	98,667	19,733	4,933	24,667
(1,48,000 in 120:24:6:30)				

(a) Statement of Profit

Particulars	Product ACH	Product BCH	Product CSH	Product DSH	Total
Sale value after split off	1,72,500	15,000	6,000	45,000	2,38,500
Less: Further Processing Cost	43,000	9,000	-	1,500	53,500
Less: Share of Joint Cost	98,667	19,733	4,933	24,667	1,48,000
Profit	30,833	(13,733)	1,067	18,833	37,000

(b) Statement of Profit

Particulars	Product ACH	Product BCH	Product CSH	Product DSH	Total
Sale value at split off	1,20,000	24,000	6,000	30,000	1,80,000
Less: Share of Joint Cost	98,667	19,733	4,933	24,667	1,48,000
Profit	21,333	4,267	1,067	5,333	32,000

18.

(a) Apportionment of Joint Cost

Joint Products	A	B	C	D	E
Output (Units)	2,00,000	30,000	25,000	20,000	75,000
Final S.P. P.U.	₹25	₹17	₹12	₹10	₹20
Final Sales Value of Output (₹)	50,00,000	5,10,000	3,00,000	2,00,000	15,00,000
(-) Further Processing Costs	(12,50,000)	(1,50,000)	(50,000)	—	(1,50,000)
N.R.V.	37,50,000	3,60,000	2,50,000	2,00,000	13,50,000
Share in J.C.	26,25,000	2,52,000	1,75,000	1,40,000	9,45,000

Income Forecast (When none of the products are further processed)

Particulars	A	B	C	D	E	Total
Sales Value at Split off point	34,00,000 (2 lakh×17)	3,90,000 (30,000×13)	2,00,000 (25,000×8)	2,00,000 (20,000×10)	10,50,000 (75,000×14)	52,40,000
(-) Share in JC	(26,25,000)	(2,52,000)	(1,75,000)	(1,40,000)	(9,45,000)	(41,37,000)
Profit Before	7,75,000	1,38,000	25,000	60,000	1,05,000	11,03,000
(-) Fixed Costs						(4,73,000)
Net Profit						6,30,000

(b) Income Forecast (When A, B, C & E are further processed)

Particulars	A	B	C	D	E	Total
Sales Value	50,00,000	5,10,000	3,00,000	2,00,000	15,00,000	75,10,000
(-) Further Processing Cost	(12,50,000)	(1,50,000)	(50,000)	—	(1,50,000)	(16,00,000)
(-) Share in J.C.	(26,25,000)	(2,52,000)	(1,75,000)	(1,40,000)	(9,45,000)	(41,37,000)
Profit Before F. C.	11,25,000	1,08,000	75,000	60,000	4,05,000	17,73,000
(-) Fixed Costs						(4,73,000)
Net Profit						13,00,000

(c)

Jain Products	Profit if none of Products are further processed	Profits if A, B, C & E are further processed	Decision to Further process
A	7,75,000	11,25,000	Yes
B	1,38,000	1,08,000	No
C	25,000	75,000	Yes
E	1,05,000	4,05,000	Yes
Total Profit Before Fixed Cost			18,03,000
A B C D E			
(11,25,000 + 1,38,000 + 75,000 + 60,000 + 4,05,000)			
(-) Fixed Cost			(4,73,000)
Net Profit			13,30,000

19.

Calculation of quantity produced

	Dept I	Dept II	Dept III
Input (Kg)	2,00,000	1,20,000	60,000
Weight lost or added	(20,000)	(20,000)	60,000
Total weight	1,80,000	1,00,000	1,20,000
Production of X	1,20,000	1,00,000	-
Production of Y	60,000	-	1,20,000

(a) Statement of apportionment of Joint Cost (₹8,75,000)

	Product X	Product Y
Output (kg)	1,20,000	60,000
Selling price per kg (₹)	8	4
Sales value (₹)	9,60,000	2,40,000
Share in Joint Cost (4:1)	**7,00,000**	**1,75,000**

(b) Statement of cost per kg

	Product X	Product Y
Share in Joint cost (₹)	7,00,000	1,75,000
Output (Kg)	1,00,000	1,20,000
Cost per kg (Joint cost)	7.00	1.458
Further processing cost per kg	1.80	1.250
Total cost per kg (₹)	**8.80**	**2.708**

(c) Statement of profit

	Product X	Product Y
Output (kg)	1,00,000	1,20,000
Sales (kg)	90,000	1,15,000
Closing Stock (Kg)	10,000	5,000
	₹	₹
Sales @ ₹10/ ₹4	9,00,000	4,60,000
Add: Closing stock (at full cost)	88,000	13,540
Value of production	9,88,000	4,73,540
Less: share in joint cost	7,00,000	1,75,000
Less: Further processing	1,80,000	1,50,000
Profit	**1,08,000**	**1,48,540**

(d) Profitability statement, before and after processing

	Product X Before (₹)	Product X After (₹)	Product Y Before (₹)	Product Y After (₹)
Sales Value	9,60,000		2,40,000	
Share in Joint Cost	7,00,000		1,75,000	
Profit	**2,60,000**	**1,08,000**	**65,000**	**1,48,540**

Product X should be sold at split off point and product Y after processing because of higher profitability.

20.

(i) Total Joint Cost = Processed cream cost + conversion cost
= (50 × 1,000 × 100) + 1,00,000 = ₹51,00,000

Statement of Joint Cost

Particulars	Buttermilk Amount (₹)	Butter Amount (₹)
Sales Value	30×28×1,000 = 8,40,000	16×1,000×480 = 76,80,000
Less: Post split-off cost	-	(1,20,000)
Net Realizable Value	8,40,000	75,60,000
Apportionment of Joint Cost of ₹51,00,000 in ratio of 1:9	5,10,000	45,90,000

(ii) Statement of Incremental Profit or Loss

Particulars	(₹)
Revenue from Ghee	16 × 1,000 ×480 = 76,80,000
(-) Revenue from Butter	20 × 1,000 × 360 = 72,00,000
Incremental Revenue	4,80,000
(-) Further processing cost	1,20,000
Incremental Profit	3,60,000

The operating income of SK Ltd. will be reduced by ₹3,60,000 in June if it sells 20 tonne of Butter to MP Ltd., instead of further processing of Butter into Ghee for sale. Thus, SK Ltd. is advised not to accept the offer and further process butter to make Ghee itself.

21.

(i) Statement of profit/(loss)

Particulars	Product X	Product Y	Product Z
Sale value (A)	100 × 50 = 5,000	70 × 80 = 5,600	80 × 60 = 4,800
Share of joint cost	4,000	2,800	3,200
(10,000 in 100:70:80)			
Further processing cost	2,000	1,200	800
Total cost (B)	6,000	4,000	4,000
Profit/(loss) (A – B)	(1,000)	1,600	800

(ii) Statement of Evaluation of Decision

Particulars	Product X	Product Y	Product Z
Sale value after FPC	100 × 50 = 5,000	70 × 80 = 5,600	80 × 60 = 4,800
(-) Sale value at split off	100 × 25 = 2,500	70 × 70 = 4,900	80 × 45 = 3,600
Incremental sales	2,500	700	1,200
(-) Further processing cost	2,000	1,200	800
Incremental Profit/(loss)	500	(500)	400

There is incremental loss in product Y and incremental profit in case of Product X and Z. Thus, it is recommended to further process product X and Z whereas Product Y should be sold without further processing i.e. at split off point.

22. Product A can be sold at the split-off point, because the question says that "Products B and C must be processed further before they can be sold". Since product A is not included in that, we know that Product a can be sold at the split off point. Furthermore, the cost to process Product a can be sold at the split off point is ₹1,50,000 whereas the additional revenue to be earned by processing it further is only ₹75,000 (₹50 increase in selling price per unit multiplied by the 1,500 units produced during September). Therefore, Product A will not be processed further and we use the sales value at split off for A for allocating the joint costs. The sales value at the split off for A is ₹100 × 1,500 units = ₹1,50,000.

Since Product B must be processed further, we use its net realizable value for the joint cost allocation. The net realizable value of Product b is ₹3,75,000 [(₹175 selling price after further processing × 3,000 units produced) - ₹1,50,000 in further processing cost].

Product C, the byproduct, must also be processed further to be sold; The net realizable value of Product C is ₹75,000 [(₹50 sales price after further processing × 4,500 units produced) - ₹1,50,000 in further processing].

Joint production costs total ₹8,40,000. Since the by-product C is accounted for as a reduction to the joint costs, the joint costs to be allocated are ₹7,65,000 (₹8,40,000 minus the ₹75,000 NRV of Product C), to be allocated between Product A (sale value of ₹1,50,000) and Product B (net realizable value ₹3,75,000). So, the total on which the allocation of the joint costs is based is ₹1,50,000 + ₹3,75,000 = ₹5,25,000. Product represents 28.571% of the total value.

Since Product A has no further processing costs, the total cost of product A is equal to its allocated joint costs which are 28.571% of the net joint costs of ₹7,65,000 or ₹2,18,568.

23. Total joint cost = Raw material cost + Processing cost = (6,750 × 80) + 2,25,000 = ₹7,65,000

Total labour cost = 2,25,000 × 66% = ₹1,48,500

Joint cost other than labour cost = 7,65,000 – 1,48,500 = ₹6,16,500

Statement of Joint Cost Apportionment

Particulars	Product M	Product N
Labour Cost (1,48,500 in 100:80)	82,500	66,000
Cost other than labour cost (6,16,500 in 80:12)	5,36,087	80,413
Share of Joint Cost	6,18,587	1,46,413

Statement of Total Cost

Particulars	Product M	Product N
Raw material cost (5,40,000 in 80:12)	4,69,565	70,435
Labour Cost (1,48,500 in 100:80)	82,500	66,000
Other Processing Cost (76,500 in 80:12)	66,522	9,978
Share of Joint Cost	6,18,587	1,46,413

24.

(i) Statement of Apportionment of Joint Cost:

Particulars		Total (₹)	Joint Products (₹)		
		A	B	X	
A.	Production (in Kgs.)	—	18,000	10,000	54,000
B.	Sale Price/Kg. at Split-off	—	50	40	10
C.	Sale Value of Production at Split-off [A × B]	18,40,000	9,00,000	4,00,000	5,40,000
D.	Share of Joint Cost in Ratio of Sale Value at Split-off Point i.e., 9:4:5:4	12,88,000	6,30,000	2,80,000	3,78,000

(ii) Statement Showing Cost

Particulars	A		B		X	
	Per Unit	Total	Per Unit	Total	Per Unit	Total
Production (In Kgs.)		18,000	--	10,000	--	54,000
Joint Cost (₹)	35	6,30,000	28	2,80,000	7	3,78,000
Further Processing Cost	10	1,80,000	15	1,50,000	2	1,08,000
Total Cost	45	8,10,000	43	4,30,000	9	4,86,000

(iii) Profitability Statement for the Period

A		Joint Products (₹)			Total (₹)
		B	X		
A.	Sale Units (Kg.)	17,000	5,000	44,000	-----
B.	Total Cost/Kg. (₹)	45	43	9	
C.	Sale Value (₹)	12,24,000	2,50,000	7,92,000	22,66,0000
	Less: Total Cost (A × B)	(7,65,000)	(2,15,000)	(3,96,000)	(13,76,000)
	Profit	4,59,000	35,000	3,96,000	8,90,000

(iv) Statement of Profit (Had the Products Been Sold at Split-off Point)

	Particulars	Joint Products (₹)			Total (₹)
		A	B	X	
A.	Sale Units (Kg.)	17,000	5,000	44,000	-----
B.	Sale Price/Kg. at Split off Point (₹)	50	40	10	-----
C.	Sale Value of Units Sold at Split off Point (A × B)	8,50,000	2,00,000	4,40,000	14,90,000
	Less: Share of Joint Cost @ ₹35, ₹28 & ₹7 per Unit Respectively	(5,95,000)	(1,40,000)	(3,08,000)	(10,43,000)
	Profit	2,55,000	60,000	1,32,000	4,47,000

Comparing the profit as per above statement & the profit as per statement prepared in point no. (ii) above we can say the profit can be maximized if:

Product 'A' is sold after processing, thus profit = ₹4,59,000

Product 'B' is sold at split-off point, thus profit = ₹60,000

Product 'X' is sold after processing, thus profit = ₹3,96,000

Total Profit = ₹9,15,00

	Alternatively,	A	B	X
A.	Sale value after further processing			
	$\frac{12,24,000}{17,000}, \frac{2,50,000}{5,000}, \frac{7,92,000}{44,000}$	72	50	18
B.	Sale value at split-off	50	40	10
C.	Cost at Split-off	35	28	7
D.	Cost after further processing	45	43	9
E.	Increase in sale price after further processing [A – B]	22	10	8
F.	Increase in cost on further processing [D – C]	10	15	2
G.	Net profit/(loss) on further processing [E – F]	12	(5)	6
H.	Advisable sale points	After Processing	At split off	After Processing

25. Computation of share of joint costs

Particulars	X (₹)	Y (₹)	Z (₹)
Selling price	13.75	8.75	7.50
Less: Profit @ 25% on cost or 20% on sales	2.75	1.75	1.50
Cost of sales	11.00	7.00	6.00
Less: Post split off cost	5.00	4.00	2.50
Joint cost per unit	6.00	3.00	3.50
Output (units)	8,000	6,000	4,000
Total cost	48,000	18,000	14,000
Actual share of net joint cost (A) (90,000 in 48:18:14)	54,000	20,250	15,750
Output (units) (B)	8,000	6,000	4,000
Joint cost per unit (A ÷ B)	6.75	3.38	3.94

Statement of Profit

Particulars	X	Y	Z
Joint cost per unit	6.75	3.38	3.94
Post split off cost	5.00	4.00	2.50
Total cost	11.75	7.38	6.44
Selling price	13.75	8.75	7.50
Margin	2.00	1.37	1.06
Margin % on cost	17.02%	18.56%	16.46%

Working Note:

(1)	Joint input cost including material cost		90,800
	Less: Realization from by-product		
	Sale value (1,000 × 1)		1,000
	Less: Profit (1,000 × 20%)	200	800
	Net Joint costs to be allocated		90,000

26.

Statement of apportionment of joint cost

	Products	
	B1 (₹)	B2 (₹)
Sales	72,000	90,000
Less: Estimated Profit 20% and 30% Respectively	14,400	27,000
Cost of Sales	57,600	63,000
Less: Selling expenses 15% of sales	10,800	13,500
Work cost	46,800	49,500
Less: Post split off cost	35,000	24,000
Share of joint cost	11,800	25,500

Thus, Share of Joint cost of M1 = ₹2,12,400 – ₹11,800 – ₹25,500 = ₹1,75,100

Statement of Profitability

	M1	B1	B2	Total
Sales	4,00,000	72,000	90,000	5,62,000
Less: Selling expenses	80,000	10,800	13,500	1,04,300
Cost of sales	3,20,000	61,200	76,500	4,57,700
Less: share of Joint cost	1,75,100	11,800	25,500	2,12,400
Less: Post separation cost	-	35,000	24,000	59,000
Profit	1,44,900	14,400	27,000	1,86,300

27.

(i) Statement of allocation of joint cost

Particulars	Product X	Product Y	Product Z	Total
Units sold	10,000	15,000	22,500	
Add: Closing stock (A)	5,000	-	7,500	
Units Produced (B)	15,000	15,000	30,000	
Selling price per unit (C)	30	64	50	
Sale value of Prod. (B × C)	4,50,000	9,60,000	15,00,000	29,10,000
Less: Additional cost	-	6,60,000	11,00,000	17,60,000
Net realizable value	4,50,000	3,00,000	4,00,000	11,50,000
Share of joint cost (D) (5,98,000 in NRV ratio)	2,34,000	1,56,000	2,08,000	5,98,000

(ii) Statement of calculation of cost of goods sold and inventory

Particulars	Product X	Product Y	Product Z	Total
Share of joint cost	2,34,000	1,56,000	2,08,000	5,98,000
Add: Additional costs	-	6,60,000	11,00,000	17,60,000
Less: Cost of inventories	$\frac{2,34,000 \times 5,000}{15,000}$ = (78,000)	-	$\frac{13,08,000 \times 7,500}{30,000}$ = (3,27,000)	(4,05,000)
Cost of goods sold	1,56,000	8,16,000	9,81,000	19,53,000

(iii) Statement of calculation of gross profit

Particulars	Product X	Product Y	Product Z	Total
Units sold	10,000	15,000	22,500	
Selling price per unit	30	64	50	
Sales	3,00,000	9,60,000	11,25,000	23,85,000
Less: Cost of goods sold	1,56,000	8,16,000	9,81,000	19,53,000
Profit / (loss)	1,44,000	1,44,000	1,44,000	4,32,000

28.

(a) Statement showing apportionment of joint cost (sales value at split – off method)

Joint Products	Production (Tonnes)	S.P. per unit at Split-off Point	Sales Value of Production	Share in Joint Cost
Caustic Soda	1,200	50	60,000	50,000
Chlorine	800	75	60,000	50,000

(b) Statement showing apportionment of joint cost (Physical Measure Method)

Joint Products	Production (Tonnes)	Share in Joint Costs
Caustic Soda	1,200	60,000
Chlorine	800	40,000

(c) Statement showing apportionment of joint cost (Net Realizable Value Method)

Joint Products	Sales Value After Further Processing	Further Processing Cost	Estimated Net Realizable Value	Share in Joint Cost
Caustic Soda	60,000	—	60,000	42,857
Chlorine	1,00,000	20,000	80,000	57,143

2. Statement showing evaluation of proposal of MP products

Particulars	Amount
Incremental Gains:	
Saving of Further Processing Costs	20,000
(A)	20,000
Incremental Costs	
Loss of Additional Sales Value (i.e. ₹1,00,000 - ₹60,000)	40,000
(B)	40,000
Net Incremental Gain/(Loss) (A) – (B)	(20,000)

❑❑❑

12 CHAPTER

Service Costing

Service or Operating Costing	• It is that form of operation costing which applies where standardized services are rendered either by an undertaking or by a service cost centre within an undertaking. • It is also known as Service Costing. • It is generally applied in road transport, railways, airlines, canteen etc.
Features of Operating Costing	• Services are standardized. • Investment in fixed assets is high and in working capital is low. • Major portion of the total cost is fixed cost. Hence, the cost per unit of service rendered is affected by the economies and scale of operations.
Applications of Service Costing	• **Internal –** It may be used for in-house services like canteen, transport, boiler house for providing steam to production dept. etc. • **External –** It is offered to outside customer like transport service by transporter, insurance, IT Companies etc.
Service Costing Vs Product Costing	• **Tangibility** – Unlike products, service are intangible and cannot be stored, hence, there is no inventory for the service. • **Cost units** – Use of composite cost units for cost measurement and to express the volume of outputs. • **Material vs Employee cost** – Unlike product manufacturing, employee cost constitute a major cost element than material cost. • **Traceability of costs** – Indirect costs have a significant portion in total cost of a service and it may not be economically feasible to trace all costs to the services.
Classification of Operating Cost	• **Operating and running costs –** These are the costs which are incurred for operating and running the vehicle. For e.g. cost of diesel, petrol etc. • **Standing Costs –** These are the costs which are incurred irrespective of operation. For e.g. rent of garage, driver salary etc. • **Maintenance Cost –** These are the costs which are incurred to keep the vehicle in good or running condition e.g. repair cost, overhauling etc.
Service Cost Unit	• In case of service industry, there can be two types of cost unit i.e. single cost unit or multiple/composite cost unit. • The selection of cost unit is a very important issue because it should reflect the realistic cost along with the effects of different factors like full time, part time, off-season etc. • Generally, composite cost units are used in case of service costing which complies with all criterions. • It can be classified in two ways i.e. Absolute (weighted average) and Commercial (simple average)

Composite Cost Unit	• It consists of two different units. • E.g. passenger-km, ton-km etc.
Absolute (weighted average) tonne-kms	• These are calculated on the basis of actual haulage from one destination to another when the same truck or station-wagon carries freight from different destinations in one trip. • It is determined by multiplying various distances by respective load quantity carried.
Commercial (simple average) tone-kms	• It is the sum total of tonnes-kms which is determined by multiplying total distance by average load quantity carried. • Numerically, Commercial tonne-km = Average load × Distance covered
Equivalent cost unit	• It is used when two or more different grade of service uses common resources. • Each grade of service is assigned a weight and converted into equivalent units.
BOT Approach	• It stands for Build-Operate-Transfer approach • It is an option for the Government to outsource public projects to the private sector. • In this case, the private sector designs, finances, constructs and operate the facility and eventually after specified concession period, the ownership is transferred to the Government.

Cost Units used in Service industry are:

Service Industry	Unit of Cost (examples)
Transport services	Passenger-km (in public transportation) Quintal-km or ton-km (in goods carriage)
Electricity supply service	Kilowatt-hour (kWh)
Hospital	Patient per day, room per day or per bed, per operation etc.
Canteen	Per item, per meal etc.
Cinema	Per ticket
Hotels	Guest Days or Room Days
Bank or Financial Institutions	Per transaction, per services (e.g. per letter of credit, per application, per project etc.)
Educational Institutes	Per course, per student, pre module etc.
IT & ITES	Cost per project, per module etc.
Insurance	Per policy, per claim, per TPA etc.

Key Performance Indicator (KPI)

These are the quantitative and qualitative factors which are used to assess the performance. Various KPIs for some service industry are as follows:

Industry	KPI	Meaning
Transportation	Number of shipments	This logistics metric monitors the number of orders that are shipped out of the warehouse.
	Truck Turnaround Rate (Truck Turning)	The time from when a delivery truck enters the warehouse to collect or deliver products to when it exits the facility.
	Lead Time (Order Cycle Time)	The amount of time in between order placement by customer and receipt of order.
	On-time and In-full (OTIF)	The number of orders delivered according to the schedule and quantity specified.
Hotel Industry	Cost per Occupied Room (CPOR)	The average cost per occupied room
	Occupancy Rate	The ratio of rented or used rooms to the total amount of available rooms
	Revenue per available room (RevPAR)	The average revenue per available room days.
Hospitals/Health care Industry	Bed Occupancy Rate	The proportion of hospital beds in use at any one time
	Self-To-Patient Ratio	The number of staff resources present to attend to the patients in a hospital over a certain period of time
	Average Treatment Charge	The average amount that a facility charges a patient for a treatment
IT & ITES Sector	Gross burn Rate	The rate at which the company sues up its available cash to cover operating expenses.
	Customer Acquisition Cost (CAC)	The amount it takes to attract new customers.
	Customer Lifetime Value (CLV)	The typical net profit a company generates over the entire life cycle of a single customer.
	Monthly Recurring Revenue (MRR)	The amount earned each month through subscription renewals, mew sales, upsells, and fluctuations on a monthly basis.
	Churn Rate	The percentage of customers that cancel their recurring subscriptions over a given time period.
	Cost per Feature	How much a specific feature costs your business, based on usage and cloud costs.
Telecom	Average return per user (ARPU)	How much money a company is making for each person using its service.

Industry	KPI	Meaning
	Subscriber acquisition cost (SAC)	Cost involved with gaining new subscribers.
	Network Operating Cost	Expenditure incurred on continual upkeep to telecom's network
	Gross Revenue Retention (GRR)	How well a company is retaining its customers based on factors such as sales price increases, organic customer growth and more.
Education Sector	Instructional Costs	The cost of part-time and full-time faculty members.
	Administrative cost per student	How much an institution is spending on administrative services on a per student basis.
	Student-to-Facility Ratio	Costs accrued by students on a semester or annual basis.
Insurance Sector	Average Cost Per Claim	The average cost of each claim mad
	Components of Claim costs (CCC)	Costs which are associated with a claim like legal fees, time to settle, administration costs, and report delays.
	Cost per Quote	The costs that the company incurs in order to get a quote in front of a potential client
	Administrative costs per policy	The cost of the policy administration to number of policies outstanding.
	Average policy size	The total amount of premium collected by the number of policies issued for a given time period.

PRACTICE QUESTIONS

Example–1: A bus travels for 25 days in a month and covers 200 kms per day. If capacity of bus is 50 passengers which is 80% occupied. Find passenger kms.

Example–2: A company has 5 buses which travel for 100 km per day. These buses don't work on 4 Sundays during the month of March. On 15th March, buses were off the road due to strike. The bus is 50 seater and usually runs 10% vacant. Find passenger kms.

Example–3: A bus works for 27 days and makes 4 trips of 30 kms each per day. The bus is 50 seater and usually runs 20% vacant. Find passenger kms.

Example–4: A bus works for 25 days and makes 4 round trips of 25 kms each per day. The bus is 50 seater and usually runs 10% vacant. Find passenger kms.

Example–5: A 10 ton truck travels between city A and B. It makes 4 round trips a day of 20 kms each. The truck is fully loaded on outward journey and returns empty. In the month of April, there are 4 Sundays on which truck doesn't work. On 20th April, truck was off the road due to strike. Find ton-km for month of April.

Example–6: A company has 20, 10 ton lorries and 30, 8 ton lorries. The lorries travel between cities A and B which are 25 kms apart. Each lorrey makes 4 trips everyday. On the outward journey, the lorries are fully loaded and on the return journey the lorries carry 80% capacity load. Assume 25 days a month. On an average 5 lorries are off the road for repair and maintenance at all times. Calculate normally effective ton-km for one year.

1. A transport service company is running five buses between two towns which are 50 kilometers apart. Seating capacity of each bus is 50 passenger. The following particulars were obtained from their books for April: **[SM]**

	₹
Wages of drivers, conductors and cleaners	24,000
Salaries of office staff	10,000
Diesel oil and other oil	35,000
Repairs and maintenance	8,000
Taxation, insurance etc.	16,000
Depreciation	26,000
Interest and other expenses	20,000
	1,39,000

Actually, passengers carried were 75% of seating capacity. All buses run on all days of the month. Each bus made one round trip per day. Find out the cost per passenger km.

Ans. ₹0.2471.

2. ABC Transport company has given a route 40 kilometers long to run bus. **[SM]**

(a) The bus costs the company a sum of ₹20,00,000
(b) It has been insured at 3% p.a. and
(c) The annual tax will amount to ₹20,000
(d) Garage rent is ₹20,000 per month
(e) Annual repairs will be ₹2,04,000
(f) The bus is likely to last for 5 years.
(g) The driver's salary will be ₹30,000 per month and the conductor's salary will be ₹25,000 per month in addition to 10% of takings as commission (to be shared by the driver and conductor equally).
(h) Cost of stationery will be ₹1,000 per month
(i) Manager-cum-accountant salary is ₹17,000 per month.
(j) The bus will make 3 up and down trips carrying on an average 40 passengers on each trip.
(k) The bus will run on an average 25 days in a month.
Assuming 15% profit on takings, calculate the bus fare to be charged from each passenger.
(l) Petrol cost will be ₹ 500 for every 100 kms travel.

Ans. ₹1.

3. Mr. X owns a bus which runs according to the following schedule: **[SM]**

(i) Delhi to Chandigarh and back, the same day

Distance covered	250 km one way
Number of days run each month	8
Seating capacity occupied	90%

(ii) Delhi to Agra and back, the same day

Distance covered	210 km one way
Number of days run each month	10
Seating capacity occupied	85%

(iii) Delhi to Jaipur and back, the same day

Distance covered	270 km one way
Number of days run each month	6
Seating capacity occupied	100%

(iv) Following are the other details:

Cost of the bus	₹12,00,000
Salary of the driver	₹24,000 p.m.
Salary of the conductor	₹21,000 p.m.
Salary of the part-time Accountant	₹5,000 p.m.
Insurance of the bus	₹4,800 p.a.
Diesel consumption 4 km per litre at	₹56 per litre
Road tax	₹15,915 p.a.
Lubricant oil	₹10 per 100 km
Permit fee	₹315 p.m.
Repairs and maintenance	₹1,000 p.m.
Depreciation of the bus	@20% p.a.
Seating capacity of the bus	50 persons

Passenger tax is 20% of the total takings. Calculate the bus fare to be charged from each passenger to earn a profit of 30% on total takings. The fares are to be indicated per passenger for the journeys:

(i) Delhi to Chandigarh; (ii) Delhi to Agra; (iii) Delhi to Jaipur.

Ans. (i) ₹225; (ii) ₹189; (iii) ₹243.

4. SK is a Public School having 25 buses each plying in different directions for the transport of its school students. In view of large number of students availing of the bus service, the buses work two shifts daily both in the morning and in the afternoon. The buses are garaged in the school. The workload of the students has been so arranged that in the morning, the first trip picks up senior students and the second trip plying an hour later picks up junior students. Similarly, in the afternoon, the first trip takes the junior students and an hour later the second trip takes the senior students home.

The distance traveled by each bus, one way is 16 km. The school works 24 days in a month and remains closed for vacation in May and June. The bus fee, however is payable by the students for all the 12 months in a year. The details of expenses for the year are as under:

Driver's salary – payable for all the 12 months	₹5,000 per month per driver
Cleaner's salary – payable for all the 12 months (one cleaner has been employed for every five buses)	₹3,000 per month per cleaner
License fees, taxed etc.	₹2,300 per bus per annum
Insurance premium	₹15,600 per bus per annum
Repairs and Maintenance	₹16,400 per bus per annum
Purchase price of the bus	₹16,50,000 each
Life of the bus	16 years
Scrap Value of each bus at the end of the life	₹1,50,000
Diesel Cost	₹18.50 per litre

Each bus gives an average of 10 km per litre of diesel. The seating capacity of each bus is 60 students. The seating capacity is fully occupied during whole year.

The school follows differential bus fees based on distance traveled as under:

Students picked up and dropped within the range of distance from the school	Bus Fare	Percentage of students availing the facility
4 km	25% of full	15%
8 km	50% of full	30%
16 km	Full	55%

Ignore interest. Since the bus fees has to be based on average cost, you are required to:

(a) Prepare a statement showing the expenses of operating a single bus and the fleet of 25 busses for a year.

(b) Work out average cost per student per month in respect of:

(i) Students coming from a distance of upto 4 km from the school

(ii) Students coming from a distance of upto 8 kms from the school

(iii) Students coming from a distance of upto 16 kms from the school

Ans. (a)1720, 9562, 19136 (b) 624072, 877527, 1284437 (c) 1577, 877, 1754

5. A company is considering three alternative proposals for conveyance facilities for its sales personnel who have to do considerable travelling, approximately 20,000 kms every year. The proposal are as follows: **[SM]**

(i) Purchase and maintain its own fleet of cars. The average cost of a car is ₹1,00,000

(ii) Allow the executive use his own car and reimburse expenses at the rate of ₹1.60 paise per kilometer and also bear insurance costs.

(iii) Hire cars from an agency at ₹20,000 per year per car. The company will have to bear costs of petrol, taxes and tyres.

The following further details are available:

Petrol ₹0.60 per km

Repairs and maintenance ₹0.20 per km

Tyre ₹0.12 per km

Insurance ₹1,200 per car per annum;

Taxes ₹800 per car per annum
Life of the car: 5 years with annual mileage of 20,000 kms
Resale value: ₹20,000 at the end of the fifth year
Work out the relative costs of three proposals and rank them.

Ans. ₹1.82; ₹1.66; ₹1.76.

6. Mr. SK now spends ₹0.90 per km on taxi for his clients' work. He is considering two other alternatives, the purchase of a new car or an old car. The estimated cost figures are:

Items	New Car	Old Car
Purchase price	35,000	20,000
Sale price, after 5 years	19,000	12,000
Repairing and servicing, per annum	1,000	1,200
Taxes and Insurance per annum	1,700	700
Petrol consumption per litre	10 km	7 km
Petrol price per litre	3.50	3.50

He estimates that he goes 10,000 km annually. Which of the three alternatives will be cheaper? If his practice expands and he has to go 19,000 km per annum, what should be his decision? At how many kms per annum will the cost of the two cars break even and why? Assume petrol only as variable cost. Ignore interest and income tax.

Ans. Old car for10,000 km; New car for 19,000 km; 16,000 km.

7. A factory which uses a large amount of coal is situated between two collieries 'S' and 'K' the former being 5 kilometers and the latter 10 kilometers distant from the factory. A fleet of lorries of 5 tonnes carrying capacity is used for the collection of coal from the pitheads. The lorries give an average speed of 20 kilometers per hour when running and regularly take 10 minutes in the factory premises to unload. At colliery 'S' loading time averages 30 minutes per load and at colliery 'K' 20 minutes per load.

Driver's wages, license, insurance, depreciation, garage and similar charges are notices to cost ₹6 per hour operated. Fuel, oil, tyres, repairs and similar charges are noticed to cost 60 paise per kilometer run. Draw up a statement showing the cost per tonne-kilometer of carrying coal form each colliery. If the coal is of equal quality and price at pithead, from which colliery should the purchases be made?

Ans. ₹0.52; ₹0.42.

8. SK Transport Ltd. charges ₹90 per ton for its 6 tons truck lorry load from city 'A' to city 'B'. The charges for the return journey are ₹84 per ton. No concession or reduction in these rates is made for any delivery of goods at intermediate station 'C'. In January, the truck made 12 outward journeys for city 'B' with full load out of which 2 ton were unloaded twice in the way at city 'C'. The truck carried a load of 8 tons in its return journey for 5 times but once caught by police and ₹1,200 was paid as fine. For the remaining trips the truck carried full load out of which all the goods on load were unloaded once at city 'C'. **[SM]**

The distance from city 'A' to city 'C' and city 'B' are 140 kms and 300 kms respectively. Annual fixed cost and maintenance charges are ₹60,000 and ₹12,000 respectively. Running charges spent during January, are ₹2,944. You are required to find out the cost per absolute ton-km and the profit for January. Also calculate cost per commercial ton-km.

Ans. ₹0.20; ₹3,224.

9. A transport company has a fleet of four trucks of 10 tonnes, capacity each plying in different directions for transport of customers' goods. The trucks run loaded with goods and return empty. The distance traveled, number trips made and the load carried per day by each truck are as under:

[RTP Nov 2019]

Truck No.	One way distance (Km)	No. of trips per day	Load carried per trip per day (tonnes)
1	48	4	6
2	120	1	9
3	90	2	8
4	60	4	8

The analysis of maintenance cost and the total distance traveled during the last two years is as under:

Year	Total distance traveled	Maintenance cost ₹
1	1,60,200	1,38,150
2	1,56,700	1,35,525

The following are the details of expenses for the last year under review:

Diesel	:	₹60 per litre. Each liter gives 4 km per litre of diesel on average
Driver Salary	:	₹22,000 per month
License and taxes	:	₹15,000 per annum per truck
Insurance	:	₹80,000 per annum for all 4 trucks
Purchase price per truck	:	₹30,00,000, Life 10 years, Scrap value at the end of life is ₹1,00,000
Oil and sundries	:	₹525 per 100 km run
General overhead	:	₹1,10,840 per annum

The vehicles operate 24 days per month on an average

Required:

(a) Prepare an Annual Cost Statement covering the fleet of four trucks

(b) Calculate the cost per Km run

(c) Determine the freight rate per tonne km to yield a profit of 30% on freight

Ans. (a) ₹1,13,39,112; (b) ₹26.89; (c) ₹10.057.

10. In order to develop tourism, ABCL airline has been given permit to operate three flights in a week between X and Y cities (both side). The Airline operates a single aircraft of 160 seating capacity. The normal occupancy is estimated at 60% throughout the year of 52 weeks. The one-way fare is ₹7,200. The costs of operation of flights are:

Variable Cost:	
Fuel Cost (variable)	₹96,000 per flight
Food served on board on non-chargeable basis	₹125 per passenger
Commission	5% of the fare applicable for all bookings
Fixed Cost:	
Aircraft Lease	₹3,50,000 per flight
Landing charges	₹72,000 per flight

Required:

(i) Calculate net operating income per flight

(ii) The airlines expect that its occupancy will increase to 108 passengers per flight if the fare is reduced to ₹6,720. Advise whether this proposal should be implemented or not.

Ans. (i) ₹1,26,640; (ii) Accept the proposal.

11. From the following data pertaining to the year prepare a cost sheet showing the cost of electricity generated per kwh by SK Thermal Power Station.

Total units generated	10,00,000 kwh
	₹
Operating labour	50,000
Repairs & maintenance	50,000
Lubricants, spares and stores	40,000
Plant supervision	30,000
Administration overheads	20,000

Coal consumed per kwh for the year is 2.5 kg @ ₹0.02 per kg. Depreciation charges @ 5% on capital cost of ₹2,00,000.

Ans. ₹0.25.

12. SK Hospital runs a Critical Care Unit (CCU) in a hired building. CCU consists of 35 beds and 5 more beds can be added, if required. **[SM]**

Rent per month	-	₹75,000
Supervisors (2 persons)	-	₹25,000 per month – each
Nurse (4 persons)	-	₹20,000 per month – each
Ward Boys (4 persons)	-	₹5,000 per month – each

Doctors paid ₹2,50,000 per month – paid on the basis of number of patients attended and the time spent by them.

Other expenses for the year are as follows:

Repair (Fixed)	-	₹ 81,000
Food to patients (variable)	-	₹8,80,000
Other services to patients (variable)	-	₹3,00,000
Laundry charges (variable)	-	₹6,00,000
Medicines (variable)	-	₹7,50,000
Other fixed expenses	-	₹10,80,000
Administration expenses allocated	-	₹10,00,000

It was estimated that for 150 days in a year 35 beds are occupied and for 80 days only 25 beds are occupied. The hospital hired 750 beds at a charge of ₹100 per bed per day, to accommodate the flow of patients. However, this does not exceed more than 5 extra beds over and above the normal capacity of 35 beds on any day.

You are required to:

(a) Calculate profit per patient day, if the hospital recovers on an average ₹2,000 per day from each patient.

(b) Find out breakeven point for the hospital.

Ans. (a) ₹691.75; (b) 3,741 patient days.

13. Following are the data pertaining to SK Pvt. Ltd. for the year: **[SM]**

Particulars	Amount (₹)
Salary to Software Engineers (5 persons)	15,00,000
Salary to Project Leader (2 persons)	9,00,000
Salary to Project Manager	6,00,000
Repairs & Maintenance	3,00,000
Administration Overheads	12,00,000

The company executes a Project PK, the details of the same are as follows:

Project duration – 6 months

One Project Leader and three Software Engineers were involved for the entire duration of the project, whereas Project Manager spends 2 months' efforts, during the execution of the Project.

Travel expenses incurred for the project – ₹1,87,500

Two laptops were purchased at a cost of ₹50,000 each, for use in the project and the life of the same is estimated to be 2 years.

Prepare project cost sheet.

Ans. ₹13,75,000.

14. SK Toll Plaza Ltd built a 60 km long highway and now operates a toll plaza to collect tolls from passing vehicles using the same. The Company has invested ₹600 crores to build the road and has estimated that a total of 60 crore vehicles will be using the highway during the 10 years toll collection tenure. Toll Operating and Maintenance cost for the month of April are as follows:

[SM, Similar Nov 2020]

(i) Salary to:

Collection Personnel (3 shifts and 4 persons per shift) – ₹150 per day per person
Supervisor (2 shifts and 1 person per shift) – ₹250 per day per person
Security Personnel (3 shifts and 2 persons per shift) – ₹150 per day per person
Toll Booth Manager (2 shifts and 1 person per shift) – ₹400 per day per person

(ii) Electricity – ₹80,000

(iii) Telephone – ₹40,000

(iv) Maintenance Cost – ₹30 lacs

(v) The company needs 25% profit over total cost to cover interest and other costs.

Required:

(a) Calculate cost per kilometer.

(b) Calculate the toll rate per vehicle (assume there is only one type of vehicle)

Ans. (a) ₹8,87,333.33; (b) ₹13.31.

15. The loan department of a bank performs several functions in addition to home loan application processing task. It is estimated that 25% of the overhead costs of loan department are applicable to the processing of home-loan application. The following information is given concerning the processing of a loan application: **[SM]**

Direct Professional labour:

Particulars	Amount (₹)
Loan Processor monthly salary:	80,000
(4 employees @ ₹20,000 each)	
Loan department overhead costs (monthly)	
Chief loan officer's salary	5,000
Telephone expenses	750
Depreciation building	2,800
Legal advice	2,400
Advertising	400
Miscellaneous	650
Total overhead costs	12,000

You are required to compute the cost of processing home loan application on the assumption that two hundred home loan applications are processed each month.

Ans. ₹415.

16. SK Lifecare Ltd. operates in life insurance business. Last year it has launched a new term insurance policy for practicing professionals 'Professionals Protection Plus'. The company has incurred the following expenditures during the last year for the policy: **[SM, RTP Nov 2018]**

Policy development cost	₹11,25,000
Cost of marketing of the policy	₹45,20,000
Sales support expenses	₹11,45,000

Policy issuance cost	₹10,05,900
Policy servicing cost	₹35,20,700
Claims management cost	₹ 1,25,600
IT Cost	₹74,32,000
Postage and logistics	₹10,25,000
Facilities cost	₹15,24,000
Employees cost	₹5,60,000
Office administration cost	₹16,20,400

Number of policy sold – 528

Total insured value of policies-₹1,320 crore

Required:

(a) Calculate total cost for Professionals Protection Plus policy segregating the costs into four main activities namely (i) Marketing and sales support, (ii) Operations, (iii) IT and (iv) Support functions.

(b) Calculate cost per policy

(c) Calculate cost per rupee of insured value.

Ans. (a) ₹2,36,03,600; (b) ₹44,703.79; (c) ₹0.0018.

17. A company runs a holiday home. For this purpose, it has hired a building at a rent of ₹10,000 per month along with 5% of total taking. It has three types of suits for its customer, viz. single room, double rooms and triple rooms. Following information is given: **[SM, RTP May 2019]**

Type of suite	Number	Occupancy percentage
Single room	100	100%
Double room	50	80%
Triple room	30	60%

The rent of double rooms suite is to be fixed at 2.5 times of the single room suite and that of triple rooms suite as twice of the double rooms suite. The other expenses for the year are as follows:

	₹
Staff salaries	14,25,000
Room attendants's wages	4,50,000
Lighting, heating and power	2,15,000
Repairs and renovation	1,23,000
Laundry charges	80,500
Interior decoration	74,000
Sundries	1,53,000

Provide profit @ 20% on total taking and assume 360 days in a year. You are required to calculate the rent to be charged for each type of suite.

Ans. ₹33.73; ₹84.33; ₹168.65.

18. A company wants to outsource the operation of its canteen to a contractor. The company will provide space for cooking, free electricity and furniture in the canteen. The contractor will have to provide lunch to 300 workers of which 180 are vegetarian (Veg) and the rest are non-vegetarian (Non-Veg). In the case of non-veg meals, there will be a non-veg item in addition to the veg items. A contractor who is interested in the contract has analyzed the costs likely to be incurred. His analysis is given below: **[May 2018]**

Cereals	₹8 per plate
Veg items	₹5 per plate
Non-veg items	₹15 per plate
Spices	₹1 per plate
Cooking oil	₹4 per plate
One cook	Salary ₹13,000 per month
Three helpers	Salary ₹7,000 per month per head
Fuel	Two commercial cylinders per month, price ₹1,000 each.

On an average the canteen will remain open for 25 days in a month. The contractor wants to charge the non-veg meals at 1.50 times of the veg meals.

You are required to calculate:

(i) The price per meal (veg and non-veg separately) that contractor should quote if he wants a profit of 20% on his takings.

(ii) The price per meal (separately for veg and non-veg) that a worker will be required to pay if the company provides 60% subsidy for meals out of welfare fund.

Ans. (i) Veg = ₹30; Non-veg = ₹45; (ii) Veg = ₹12; Non-veg = ₹18.

19. AD Higher Secondary School (AHSS) offers courses for 11^{th} & 12^{th} standard in three streams i.e. Arts, Commerce and Science. AHSS runs higher secondary classes alongwith primary and secondary classes but for accounting purpose it treats higher secondary as a separate responsibility centre. The Managing committee of the school wants to revise its fee structure for higher secondary students. The accountant of the school has provided the following details for a year:

[SM, RTP May 2020]

	Amount (₹)
Teachers' salary (15 teachers × ₹35,000 × 12 months)	63,00,000
Principal's salary	14,40,000
Lab attendants' salary (2 attendants × ₹15,000 × 12 months)	3,60,000
Salary to library staff	1,44,000
Salary to peons (4 peons × ₹10,000 × 12 months)	4,80,000
Salary to other staffs	4,80,000
Examinations expenditure	10,80,000
Office & Administration cost	15,20,000
Annual day expenses	4,50,000
Sports expenses	1,20,000

(i) Other Information:

	Standard 11 & 12			Primary & Secondary
	Arts	Commerce	Science	
No. of students	120	360	180	840
Lab classes in a year	0	0	144	156
No. of examinations in a year	2	2	2	2
Time spent at library per student per year	180 hours	120 hours	240 hours	60 hours
Time spent by principal for admission	208 hours	312 hours	480 hours	1,400 hours
Teachers for 11 & 12 standard	4	5	6	-

(ii) One teacher who teaches economics for Arts stream students also teaches commerce stream students. The teacher takes 1,040 classes in a year, it includes 208 classes for commerce students.

(iii) There is another teacher who teaches mathematics for Science stream students also teaches business mathematics to commerce stream students. She takes 1,100 classes a year, it includes 160 classes for commerce students.

(iv) One peon is fully dedicated for higher secondary section. Other peons dedicate their 15% time for higher secondary section.

(v) All school students irrespective of section and age participate in annual functions and sports activities.

Requirement:

(a) CALCULATE cost per student per annum for all three streams.

(b) If the management decides to take uniform fee of ₹1,000 per month from all higher secondary students, CALCUALTE stream wise profitability.

(c) If management decides to take 10% profit on cost, COMPUTE fee to be charged from the students of all the three streams respectively.

Ans. (a) 1720, 9562, 19136 (b) – 624072, 877527, – 1284437 (c) 1577, 877, 1754

PRACTICE QUESTIONS

20. A transport company has been given a 40 kilometer long route to run 5 buses. The cost of each bus is ₹6,50,000. The buses will make 3 round trips per day carrying on an average 80 percent passengers of their seating capacity. The seating capacity of each bus is 40 passenger. The buses will run on an average 25 days in a month. The other information for the year are given below:

Garage rent	₹4,000	per month
Annual repairs and maintenance	₹22,500	each bus
Salaries of 5 drivers	₹3,000	each per month
Wages of 5 drivers	₹1,200	each per month
Manager's salary	₹7,500	per month
Road tax, permit fee etc.	₹5,000	for a quarter

Office expenses	₹2,000	per month
Cost of diesel per litre	₹33	
Kilometer run per litre for each bus	6 kilometers	
Annual depreciation	15% of cost	
Annual Insurance	3% of cost	

You are required to calculate the bus fare to be charged from each passenger per kilometer, if the company wants to earn profits of 33.33% on taking (total receipts form passenger).

Ans. ₹0.405.

21. Calculate a suggested fare per passenger-km from the following information for a Mini Bus: **[MTP Nov 2018]**

(a) Length of route: 30 km

(b) Purchase price ₹4,00,000

(c) Part of above cost met by loan, annual interest of which is ₹10,000 p.a.

(d) Other annual charges: Insurance ₹15,000, Garage rent ₹9,000, Road tax ₹3,000, Repair & maintenance ₹15,000, Administrative charges ₹5,000.

(e) Running Expenses: Driver & Conductor ₹5,000 p.m., Repairs/Replacement of tyre-tube ₹3,600 p.a., Diesel and oil cost per km ₹5

(f) Effective life of vehicle is estimated at 5 years at the end of which it will have a scrap value of ₹10,000.

(g) Mini bus has 20 seats and is planned to make Six no. two way trips for 25 days/p.m.

(h) Provide profit @ 20% of total revenue.

Ans. ₹0.42743.

22. M/s XY Travels has been given a 25 km long route to run an air-conditioned Mini Bus. The cost of bus is ₹20,00,000. It has been insured @3% premium per annum while annual road tax amounts to ₹36,000. Annual repairs will be ₹50,000 and the bus is likely to last for 5 years. The driver's salary will be ₹2,40,000 per annum, and the conductor's salary will be ₹1,80,000 per annum in addition to 10% of the takings as commission (to be shared by the driver and the conductor equally). Office and administration overheads will be ₹18,000 per annum. Diesel and oil will be ₹1,500 per 100 km. The bus will make 4 round trips carrying on an average 40 passengers on each trip. **[Nov 2018]**

Assuming 25% profit on takings and considering that the bus will run on an average 25 days in a month, you are required to:

(i) Prepare operating cost sheet (for the month)

(ii) Calculate fare to be charged per passenger km

Ans. (i) Total cost = ₹1,57,000; (ii) ₹1.20769.

23. A mini-bus, having a capacity of 32 passengers, operates between two places – 'A' and 'B'. The distance between the place 'A' and place 'B' is 30 km. The bus makes 10 round trips in a day for 25 days in a month. On an average, the occupancy ratio is 70% and is expected throughout the year. The details of other expenses are as under:

	Amount (₹)	
Insurance	15,600	per annum
Garage Rent	2,400	per quarter
Road tax	5,000	per annum
Repairs	4,800	per quarter
Salary of operating staff	7,200	per month
Tyres and Tubes	3,600	per quarter
Diesel (one litre is consumed for every 5 km)	13	per litre
Oil and Sundries	22	per 100 km
Depreciation	68,000	per annum

Passenger tax @ 22% on total taking is to be levied and bus operator requires a profit of 25% on total takings. Prepare operating cost statement on the annual basis and find out the cost per passenger kilometer and one way fare per passenger.

Ans. ₹13,69,433; ₹0.18; ₹10.20.

24. Royal Transport Service runs fleet of buses within the limits of Jaipur city. The following are the details which were incurred by the company during October, 2021: **[RTP Nov 2022]**

	(₹)
Cost of each bus	24,00,000
Garage rent	1,00,000
Insurance	25,000
Road tax	20,000
Manager's Salary	60,000
Assistant's Salary (Two)	32,000 each
Supervisor's Salary (Three)	24,000 each
Driver's Salary (Twenty-Five)	20,000 each
Cleaner's Salary (Twenty)	5,000 each
Office Staff's Salary	1,00,000
Consumables	1,20,000
Repairs & Maintenance	90,000
Other fixed expenses	72,000
Diesel (10 Kms per Litre)	80 per litre
Oil & Lubricants	1,45,000
Tyres and tubes	35,000
Depreciation	10% p.a. on cost

Other details are as below:

	Capacity
12 Buses	60 Passengers
13 Buses	50 Passengers

Each bus makes 4 round trips a day covering a distance of 10 Kilomteres in each trip (One way) on average. During the trips 80% of the seats are occupied. The annual records show that 5 buses are generally required to be kept away from roods each day for repairs. You are required to calculate cost per passenger-km. Cost sheet to be prepared on the basis of 25 buses.

Ans. ₹1.103.

25. SK Cabs Pvt. Ltd. is a New Delhi based cab renting company, provides cab facility on rent for cities Delhi, Agra and Jaipur to the tourists. To attract more tourists it has launched a new three days tour package for Delhi-Jaipur-Agra-Delhi. Following are the relevant information regarding the package:

Distance between Delhi to Jaipur (Km.)	274
Distance between Delhi to Agra (Km.)	242
Distance between Agra to Jaipur (Km.)	238
Price of diesel in Delhi	₹54 per litre
Price of diesel in Jaipur	₹56 per litre
Price of diesel in Agra	₹58 per litre
Mileage of cab per litre of diesel (Km.)	16
Chauffeur's salary	₹12,000 per month
Cost of the cab	₹12,00,000
Expected life of the cab	24,00,000 kms
Servicing cost	₹30,000 after every 50,000 kms run
Chauffeur's meal allowance	₹50 every 200 Kms of completed journey
Other set up and office cost	₹2,400 per month

SK Cabs has made tie-up with fuel service centres at Agra, Jaipur and Delhi to fill diesel to its cabs on production of fuel passbook to the fuel centre. Company has a policy to get fuel filled up sufficient to reach next destination only.

You are required to calculate the price inclusive of GST @ 18% to be quoted for the package if company wants to earn profit of 25% on its net takings i.e. excluding GST.

Ans. ₹7,952.26.

26. Navya LMV Pvt. Ltd., operates cab/car rental service in Delhi/NCR. It provides its service to the offices of Noida, Gurugram and Faridabad. At present it operates CNG fueled cars but it is also considering to upgrade these into Electric vehicles (EV). The details related with the owning of CNG & EV propelled cars are as tabulated below: **[RTP May 2022]**

Particulars	CNG Car	EV Car
Car purchase price (₹)	9,20,000	15,20,000
Govt. subsidy on purchase of car (₹)	-	1,50,000
Life of the car	15 years	10 years
Residual value (₹)	95,000	1,70,000
Mileage	20 km/kg	240 km per charge
Electricity consumption per full charged	-	30 Kwh
CNG cost per Kg (₹)	60	-
Power cost per Kwh (₹)	-	7.60
Annual Maintenance cost (₹)	8,000	5,200
Annual insurance cost (₹)	7,600	14,600
Tyre replacement cost in every 5 year (₹)	16,000	16,000
Battery replacement cost in every 8 years (₹)	12,000	5,40,000

Apart from the above, the following are the additional information:

Particulars	
Average distance covered by a car in a month	1,500 km
Driver's salary (₹)	20,000 p.m.
Garage rent per car (₹)	4,500 p.m.
Share of office and administration cost per car (₹)	1,500 p.m.

Required to calculate the operating cost of vehicle per month per car for both CNG & EV option.

Ans. CNG = ₹36,627.78; EV = ₹43,708.33.

27. SK Milk Co-Operative Society (SMCS) collects raw milk from the farmers of Ramgarh, Pratapgarh and Devgarh panchayats and processes these milks to make various dairy products. SMCS has its own vehicles (tankers) to collect and bring the milk to the processing plant. Vehicles are parked in the SMCS's garage situated within the plant compound. Following are the information related with the vehicles:

	Ramgarh	Pratapgarh	Devgarh
No. of vehicles assigned	4	3	5
No. of trips a day	3	2	2
One way distance from the processing	24 k.m.	34 k.m.	16 k.m.
Toll tax paid p.m. (₹)	2,850	3,020	---

All the 5 vehicles assigned to Devgarh panchayat, were purchased five years back at a cost of ₹9,25,000 each. The 4 vehicles assigned to Ramgarh panchayat, were purchased two years back at a cost of ₹11,02,000 each and the remaining vehicles assigned to Pratapgarh were purchased last year at a cost of ₹13,12,000 each. With the purchase of each vehicle a two years free servicing warranty is provided. A vehicle gives 10 kmpl mileage in the first two year of purchase, 8 kmpl

in next two years and 6 kmpl afterwards. The vehicles are subject to depreciation of 10% p.a. on straight line basis irrespective of usage. A vehicle has the capacity to carry 25,000 litres of milk but on an average only 70% of the total capacity is utilized.

The following expenditure is related with the vehicles:

Salary to a Driver (a driver for each vehicle)	₹18,000 p.m.
Salary to a Cleaner (a cleaner for each vehicle)	₹11,000 p.m.
Allocated garage parking fee	₹1,350 per vehicle per month
Servicing cost	₹3,000 for every complete 5,000 k.m. run.
Price of diesel per litre	₹58.00

From the above information you are required to calculate

(a) Total operating cost per month for each vehicle. (Take 30 days for the month)

(b) Vehicle operating cost per litre of milk.

Ans. (a) ₹73,815.75; ₹65,954; ₹57,218.40; (b) ₹0.053.

28. A transport company has 20 vehicles, for which capacities are as follows: **[RTP Nov 2020]**

No. of vehicles	Capacity per vehicle
5	9 tonne
6	12 tonne
7	15 tonne
2	20 tonne

The company provides the goods transport service between stations 'S' to station 'K'. Distance between these stations is 200 kilometer. Each vehicle makes one round trip per day on an average. Vehicles are loaded with an average of 90% of capacity at the time of departure from station 'S' to station 'K' and at the time of return back loaded with 70% of capacity. 10% of vehicles are laid up for repairs every day. The following information are related to the month of October:

Salary of Transport Manager	₹30,000
Salary of 30 drivers	₹4,000 each driver
Wages of 25 helpers	₹2,000 each helper
Wages of 20 labourers	₹1,500 each labourer
Consumable stores	₹45,000
Insurance (Annual)	₹24,000
Road license (Annual)	₹60,000
Cost of diesel per litre	₹35
Kilometers run per litre each vehicle	5 km
Lubricating oil etc.	₹23,500
Cost of replacement of tyers, tubes, other parts etc.	₹1,25,000
Garage rent (Annual)	₹90,000
Transport Technical Service Charges	₹10,000
Electricity and Gas charges	₹5,000
Depreciation of vehicles	₹2,00,000

There is a workshop attached to transport department which repairs these vehicles and other vehicles also. 40 percent of transport manager's salary is debited to the workshop. The transport department is charged ₹28,000 for the service rendered by the workshop during October. During the month of October, operation was 25 days. You are required:

(a) Calculate per ton-km operating cost

(b) Find out the freight to be charged per ton-km, if the company earned a profit of 25% on freight.

Ans. (a) ₹1.0228; (b) ₹1.36.

29. X Ltd. distributes' its goods to a regional dealer using single lorry. The dealer premises are 40 kms away by road. The capacity of the lorry is 10 tonnes. The lorry makes the journey twice a day fully loaded on the outward journey and empty on return journey. The following information is available:

Diesel Consumption	8 km per litre
Diesel Cost	₹60 per litre
Engine Oil	₹200 per week
Driver's Wages (fixed)	₹2,500 per week
Repairs	₹600 per week
Garage Rent	₹800 per week
Cost of Lorry (excluding cost of tyres)	₹9,50,000
Life of Lorry	1,60,000 kms
Insurance	₹18,200 per annum
Cost of Tyres	₹52,500
Life of Tyres	25,000 kms
Estimated sale value of the lorry at end of its life is	₹1,50,000
Vehicle License Cost	₹7,800 per annum
Other Overhead Cost	₹41,600 per annum

The lorry operates on a 5 day week.

Required:

(i) A statement to show the total cost of operating the vehicle for the four week period analyzed into Running cost and Fixed cost.

(ii) Calculate the vehicle operating cost per km and per tonne km. (Assume 52 weeks in a year)

Ans. (i) ₹68,320; (ii) ₹21.35; ₹4.27.

30. Chiku Transport Service is a Delhi based national goods transport service provider, owning four trucks for this purpose. The cost of running and maintaining these trucks are as follows:

[MTP May 2024]

Particulars	Amount
Diesel cost	₹19.20 per km
Engine oil	₹4,200 for every 13,000 km
Repair & Maintenance	₹36,000 for every 10,000 km

Driver's salary	₹24,000 per truck per month
Cleaner's salary	₹15,000 per truck per month
Supervision and other general expenses	₹14,000 per month
Cost of loading of goods	₹180 per Metric Ton (MT)

All four trucks were purchased for ₹30 lakhs with an estimated life of 7,20,000 km each. During the next month, it is expecting 6 bookings, the details are as follows:

S. No.	Journey	Distance in km	Weight-Up (in MT)	Weight-Down (in MT)
1	Delhi to Kochi	2,700	14	6
2	Delhi to Guwahati	1,890	12	0
3	Delhi to Vijayawada	1,840	15	0
4	Delhi to Varanasi	815	10	0
5	Delhi to Asansol	1,280	12	4
6	Delhi to Chennai	2,185	10	8
	Total	10,710	73	18

Required:

(i) Calculate the total absolute Ton-km for the vehicles

(ii) Calculate the cost per ton-km

31. From the following data pertaining to the year 2020-21, prepare a cost statement showing the cost of electricity generated per kwh by PK Thermal Power Station. **[SM]**

Total units generated	10,00,000 kwh
	(₹)
Operating labour	15,00,000
Repairs & maintenance	5,00,000
Lubricants, spares and stores	4,00,000
Plant supervision	3,00,000
Administration overheads	20,00,000

5 kwh of electricity generated per kg of coal consumed @ ₹4.25 per kg. Depreciation charges @5% on capital cost of ₹2,00,00,000.

Ans. ₹6.55.

32. Solar Power Ltd. has a power generation capacity of 1000 Megawatt per day. On an average it operates at 85% of its installed capacity. The cost structure of the plant is as under: **[SM]**

	Cost particulars	Amount (₹in lakhs)
1.	Employee cost per year	2500
2.	Solar panel maintenance cost per year	250

3.	Site maintenance cost per year	150
4.	Depreciation per year	5940

Calculate cost of generating 1kW of power.

[1 Megawatt – 1,000 kW]

Ans. ₹2.849.

33. A group of 'Health Care Services' has decided to establish a Critical Care Unit in a metro city with an investment of ₹85 lakhs in hospital equipments. The unit's capacity shall be of 50 beds and 10 more beds, if required, can be added. **[May 2018]**

Other information for a year are as under:

	₹
Building Rent	2,25,000 per month
Manager Salary (Number of Manager – 03)	50,000 per month to each one
Nurses Salary (Number of Nurses – 24)	18,000 per month to each Nurse
Ward Boy's Salary (Number of Ward Boys – 24)	9,000 per month per person
Doctor's payment (Paid on the basis of number of patients attended and time spent by them)	5,50,000 per month
Food and laundry services (variable)	39,53,000
Medicines to patients (variable)	22,75,000 per year
Administrative Overheads	28,00,000 per year
Depreciation on equipments	15% per annum on original cost

It was reported that for 200 days in a year 50 beds were occupied, for 105 days 30 beds were occupied and for 60 days 20 beds were occupied.

The hospital hired 250 beds at a charge of ₹950 per bed to accommodate the flow of patients. However, this never exceeded the normal capacity of 50 beds on any day. Find out:

(i) Profit per patient day, if hospital charges on an average ₹2,500 per day from each patient

(ii) Break-even point per patient day (Make calculation on annual basis)

Ans. (i) ₹485.17; (ii) 10,187.

34. SLS Infrastructure builts and operates a 110 km long highway on the basis of Built-Operate-Transfer (BOT) model for a period of 25 years. A traffic assessment has been carried out to estimate the traffic flow per day. The details are as below: **[SM, MTP Nov 2019]**

S. No.	Type of Vehicle	Daily Traffic Volume
1.	Two wheelers	44,500
2.	Car and SUVs	3,450

3.	Bus and LCV	1,800
4.	Heavy commercial vehicles	816

The following is the estimated cost of the project:

S. No.	Activities	Amount (₹in lakh)
1.	Site clearance	170.70
2.	Land development and filling work	9,080.35
3.	Sub base and base courses	10,260.70
4.	Bituminous work	35,070.80
5.	Bridge, Flyovers, underpass, Pedestrian subway, footbridge etc.	29,055.60
6.	Drainage and protection work	9,040.50
7.	Traffic sign, marking and road appurtenance	8,405.00
8.	Maintenance, repairing and rehabilitation	12,429.60
9.	Environmental management	982.00
	Total Project Cost	1,14,495.25

An average cost of ₹1,120 lakh has to be incurred on administration and toll plaza operation. On the basis of the vehicle specifications (i.e. weight, size time saving etc.) the following weights has been assigned to the passing vehicles:

S. No.	Type of vehicle	
1.	Two Wheelers	5%
2.	Car and SUVs	20%
3.	Bus and LCV	30%
4.	Heavy Commercial Vehicles	45%

Required:

(a) Calculate the total project cost per day of concession period

(b) Compute toll fee to be charged for per vehicle of each type, if the company wants to earn a profit of 15% on total cost

[Note: Concession period is a period for which an infrastructure is allowed to operate and recovers its investment]

Ans. (a) ₹12.67; (b) ₹19.06.

35. ABC Bank is having a branch which is engaged in processing of 'Vehicle Loan' and 'Education Loan' applications in addition to other services to customers. 30% of the overhead costs for the branch are estimated to be applicable to the processing of 'Vehicle Loan' applications and 'Education Loan' applications each. **[Nov 2022]**

Branch is having four employees at a monthly salary of ₹50,000 each, exclusively for processing of Vehicle Loan applications and two employees at a monthly salary of ₹70,000 each, exclusively for processing of Education Loan applications.

In addition to above, following expenses are incurred by the Branch:

Branch Manager who supervises all the activities of branch, is paid at ₹90,000 per month.

Legal charges, Printing & stationery and advertising expenses are incurred at ₹30,000, ₹12,000 and ₹18,000 respectively for a month.

Other expenses are ₹10,000 per month.

You are required to:

(a) Compute the cost of processing a Vehicle Loan application on the assumption that 496 Vehicle Loan applications are processed each month.

(b) Find out the number of Education Loan applications if the total processing cost per Education Loan Application is sale as in the Vehicle loan Application as computed in (i) above.

Ans. (a) ₹500; (b) 376 applications.

36. MRSL Healthcare Ltd. has incurred the following expenditure during the last year for its newly launched 'COVI-19' Insurance policy: **[July 2021]**

	₹
Office administration cost	48,00,000
Claim management cost	3,80,000
Employees' cost	16,20,000
Postage and logistics	32,40,000
Policy issuance cost	29,50,000
Facilities cost	46,75,000
Cost of marketing of the policy	1,38,90,000
Policy development cost	35,00,000
Policy servicing cost	96,45,000
Sales support expenses	32,00,000
IT cost	?

Number of Policy sold: 2,800

Total insured value of policies - ₹3,500 crores

Cost per rupee of insured value - ₹0.002

You are required to:

(i) Calculate the total cost for "COVID-19" Insurance policy segregating the costs into four main activities namely (a) Marketing and Sales support (b) operations (c) IT Cost and (d) Support functions.

(ii) Calculate cost per policy

Ans. (i) ₹7,00,00,000; (ii) ₹25,000.

37. A hotel is being run in a Hill station with 200 single rooms. The hotel offers concessional rates during six off-season months in a year. During this period, half of the full room rent is charged. The management's profit margin is targeted at 20% of the room rent. The following are the cost estimates and other details for the year ending 31st March, 2019: **[SM, Nov 2019]**

(i) Occupancy during the season is 80% while in the off-season it is 40%.

(ii) Total investment in the hotel is ₹300 lakhs of which 80% relates to Buildings and the balance to Furniture and other Equipment.

(iii) Room attendants are paid ₹15 per room per day on the basis of occupancy of rooms in a month.

(iv) Expenses:

Staff salary (excluding that of room attendants)	₹8,00,000
Repairs to Buildings	₹3,00,000
Laundry Charges	₹1,40,000
Interior Charges	₹2,50,000
Miscellaneous Expenses	₹2,00,200

(v) Annual Depreciation is to be provided on Buildings @ 5% and 15% on Furniture and other Equipments on straight line method.

(vi) Monthly lighting charges are ₹110, except in four months in winter when it is ₹30 per room and this cost is on the basis of full occupancy for a month.

You are required to workout the room rent chargeable per day both during the season and the off-season months using the foregoing information.

(Assume a month to be of 30 days and winter season to be considered as part of off-season).

Ans. ₹158.72; ₹79.36.

38. A hotel having 20 single rooms is having 80% occupancy in normal season (8 months) and 50% in off-season (4 months) in a year (take 30 days month). **[MTP May 2024]**

	Amount in ₹
Annual Fixed expenses	
Salary of the staff	15,00,000
Repair & Maintenance	12,60,000
Depreciation on building & furniture	12,40,000
Other fixed expenses like dusting, sweeping etc.	13,25,000
	53,25,000
Variable expenses (per guest per day)	
Linen, laundry & security support	80.00
Electricity & other facilties	120.00
Misc. expenses like attendant etc.	300.00
	500.00

Management wishes to make a margin of 25% of total cost.

Required

(a) Calculate the Tariff per room per day.

(b) Calculate the break-even occupancy in normal season (in percentage also) assuming there is 50% occupancy in off-season.

Ans. (a) ₹1,945.68; (b) 2483 room days

39. Find out the most appropriate unit cost from the following information of ZMD Transport Services Ltd. dealing in goods carriage:

Total cost = ₹5,25,000
Kms. Travelled = 8,75,000 Tonnes carries = 4,000
No. of Drivers = 25
No. of trucks = 20
Tonnes Km carried = 6,55,000
(a) ₹0.6 (b) ₹0.8 (c) ₹21,000 (d) ₹131.25

Ans. 0.8

SOLUTION OF PRACTICE QUESTIONS

20. Operating Cost Sheet for the year

Particulars	(Total Passenger Km = 115,20,000)	
	Total Cost (₹)	Cost per Pass. Km (₹)
A. Fixed Charges:		
Garage rent (4,000 × 12)	48,000	
Salary of drivers (3,000 × 5 × 12)	1,80,000	
Wages of Conductors (1200 × 5 × 12)	72,000	
Manager's salary (7,500 × 12)	90,000	
Road Tax, Permit fee, etc. (5,000 × 4)	20,000	
Office expenses (2,000 × 12)	24,000	
Insurance ($6,50,000 \times \frac{3}{100} \times 5$)	97,500	
Repairs and Maintenance (22,500 × 5)	1,12,500	
Depreciation ($6,50,000 \times \frac{15}{100} \times 5$)	4,87,500	
Total (A)	11,31,500	0.098
B. Variable Charges:		
Diesel: $\frac{3,60,000}{6} \times$ ₹33	19,80,000	0.172
Total (B)	19,80,000	0.172
Total Cost (A + B)	31,11,500	0.270
Add: 33-1/3 percent Profit on takings or 50% on cost	15,55,750	0.135
Bus fare to be charged from each passenger per km [31,11,500 ÷ 66.666667%]	46,67,250	0.405

Working Notes:

(i) Total Kilometers to be run during the year = 40 × 2 × 3 × 25 × 12 × 5 = 3,60,000 Kilometers

Total passenger Kilometers $= 3,60,000 \times 40 \times \frac{80}{100} = 1,15,20,000$ Passenger km

21. Total distance travelled by mini bus = 60 km × 6 tips × 25 days = 9,000 km

Total Passenger-km = 9,000 km × 20 seats = 1,80,000 passenger-km

Statement of calculation of fare per passenger-km

Particulars	Amount (₹)
Fixed Expenses:	
Insurance (15,000 ÷ 12)	1,250
Garage rent (9,000 ÷ 12)	750
Road tax (3,000 ÷ 12)	250
Administrative charges (5,000 ÷ 12)	417
Depreciation [(4,00,000 – 10,000) ÷ (5 × 12)]	6,500
Interest on loan (10,000 ÷ 12)	833
Total Fixed cost (A)	10,000
Running Expenses:	
Repair & Maintenance (15,000 ÷ 12)	1,250
Replacement of tyre-tube (3,600 ÷ 12)	300
Diesel and oil cost (9,000 × 5)	45,000
Driver and conductor salary	5,000
Total Running cost (B)	51,550
Total Cost (A + B)	61,550.00
Add: Profit 20% of total revenue or 25% of total cost	15,387.50
Total revenue	76,937.50
Passenger km	1,80,000
Rate per passenger-km	0.42743

22. **Calculation of Passenger Kms**

No.	×	Kms	×	Passenger	=	Passenger Kms
1	×	25 × 4 × 2 × 25	×	40	=	2,00,000

Kms travel = 1 × 25 × 4 × 2 × 25 = 5,000 kms

Statement of Operating Cost

Particulars	Amount (₹)
Fixed Cost:	
Depreciation $\left[\left(\frac{20,00,000-0}{5}\right)\times\frac{1}{12}\right]$	33,333.33
Insurance (20,00,000 × 3% × 1/12)	5,000.00

Particulars	Amount (₹)
Road tax (36,000 ÷ 12)	3,000.00
Total Fixed Cost (A)	41,333.33
Variable Cost:	
Driver Salary (2,40,000 ÷ 12)	20,000
Conductor Salary (1,80,000 ÷ 12)	15,000
Diesel and oil $\left(\frac{1500}{100}\times 5{,}000\right)$	75,000
Total Variable Cost (B)	1,10,000
Maintenance Cost:	
Annual Repairs (50,000 ÷ 12)	4,166.67
Office and administration overheads (18,000 ÷ 12)	1,500.00
Total Maintenance Cost (C)	5,666.67
Total Cost (A + B + C)	1,57,000
(+) Commission (2,41,538 × 10%)	24,154
(+) Profit (2,41,538 × 25%)	60,634
Total Takings (1,57,000 ÷ 65%)	2,41,538
Effective Passenger km	2,00,000
Takings per effective passenger km	**1.20769**

23.

Particulars		Amount
A. Fixed Charges:		
Insurance		15,600
Garage Rent: ₹2,400 × 4		9,600
Road Tax		5,000
Repairs: ₹4,800 × 4		19,200
Salary of Operating Staff: ₹7,200 × 12		86,400
Depreciation		68,000
Total (A)		2,03,800
B. Variable Charges:		
Cost of diesel: $\frac{1{,}80{,}000}{5}\times$ ₹ 13		4,68,000
Oil & Sundries: $\frac{1{,}80{,}000}{100}\times$ ₹ 22		39,600
Tyres & Tubes: ₹3,600 × 4		14,400
Total (B)		5,22,000
	A. **Total Cost (A + B)**	7,25,800
Add: Passenger tax		3,01,275
Add: Profit Margin	$\left[\frac{7{,}25{,}800}{100\% - 22\% - 25\%}\right]$	3,42,358
	Total Takings	13,69,433

No. of passenger kms = 10 × 2 × 30 × 25 × 12 × 32 × 70% = 40,32,000

Cost per Passenger – Km = $\frac{7,25,800}{40,32,000}$ = ₹0.18

One way fare per passenger = $\frac{13,69,433}{40,32,000} \times 30$ = ₹10.20

24.

Calculation of Passenger Kms

No.	×	Kms	×	Passenger	=	Passenger Kms
12	×	10 × 4 × 2 × 31	×	60 × 80%	=	14,28,480
13	×	10 × 4 × 2 × 31	×	50 × 80%	=	12,89,600
				Total	=	27,18,080
				(–) Normal loss	=	5,43,616
				Effective passenger km	=	21,74,464

Kms travel = (10 × 4 × 2 × 31)(12 + 13) = 62,000 kms

Actual total km travel = 62,000 × 20/25 = 49,600 kms

Statement of Operating Cost

Particulars	Amount (₹)
Fixed Cost:	
Depreciation (24,00,000 × 10% × 1/12 × 25)	5,00,000
Garage Rent	1,00,000
Insurance	25,000
Road tax	20,000
Manager's Salary	60,000
Assistant's Salary (32,000 × 2)	64,000
Supervisor's Salary (24,000 × 3)	72,000
Driver's Salary (20,000 × 25)	5,00,000
Cleaner's Salary (5,000 × 20)	1,00,000
Office Staff's Salary	1,00,000
Consumables	1,20,000
Repairs and maintenance	90,000
Other fixed expenses	72,000
Total Fixed Cost (A)	18,23,000
Variable Cost:	
Diesel [(49,600 ¸ 10) × 80]	3,96,800
Oils and lubricants	1,45,000
Tyres and tubes	35,000
Total Variable Cost (B)	5,76,800
Total Cost (A + B)	23,99,800
Effective Passenger km	21,74,464
Cost per effective passenger km	**1.103**

25. Calculation of Price of the Delhi-Jaipur-Agra-Delhi tour package

Particulars	Amount (₹)	Amount (₹)
Diesel Cost (Working Note-2)		2,635.00
Servicing cost $\left(\frac{₹\,30,000}{50,000\text{ km.}} \times 754\text{ kms}\right)$		452.40
Chauffeur's meal cost (three 200 km. completed journey × ₹50)		150.00
Other Allocable costs:		
Depreciation $\left(\frac{₹\,12,00,000}{24,00,000\text{ km.}} \times 754\text{ kms}\right)$	377.00	
Other set-up and office cost $\left(\frac{₹\,2,400}{30\text{ days}} \times 3\text{ days}\right)$	240.00	
Chauffeur's salary $\left(\frac{₹\,12,000}{30\text{ days}} \times 3\text{ days}\right)$	1,200.00	1,817.00
Total cost		5,054.40
Add: Profit (25% of net takings of 1/3rd of total cost)		1,684.80
(5,054.40 ÷ 75%)		6,739.20
Add: GST @ 18%		1,213.06
Price of the package (inclusive of GST)		**7,952.26**

Working Notes

(1) Total distance of journey

From	To	Distance (in km)
Delhi	Jaipur	274
Jaipur	Agra	238
Agra	Delhi	243
Total distance		754

(2) Cost of diesel

From	To	Distance (in km)	Price of diesel per litre (₹)	Total diesel Cost (₹)
I	**II**	**III**	**IV**	**V=(III÷16 km)×IV**
Delhi	Jaipur	274	54	924.75
Jaipur	Agra	238	56	833.00
Agra	Delhi	242	58	877.25
		Total cost		**2,635.00**

26. Working Notes:

1. Calculation of Depreciation per month

	Particulars	CNG Car	EV Car
A.	Car Purchase price (₹)	9,20,000	15,20,000
B.	Less: Govt. Subsidy	-	(1,50,000)
C.	Less: Residual value (₹)	(95,000)	(1,70,000)
D.	Depreciation value of cat (₹) (A – B – C)	8,25,000	12,00,000
E.	Life of the car	15 years	10 years
F.	Depreciation per month (₹) [D ÷ (E × 12)]	4,583.33	10,000

2. Fuel/Electricity consumption per month

	Particulars	CNG Car	EV Car
A.	Average distance covered in a month	1,500	1,500
B.	Mileage (KM)	20	240
C.	Quantity of CNG/Full charge required (A × B)	75 kg	6.25
D.	Electricity consumption (C × 30 Kwh)	-	187.5
E.	Cost of CNG per kg (₹)	60	-
F.	Power cost per Kwh (₹)	-	7.60
G.	CNG Cost per month (₹) (C × E)	4,500	-
H.	Power cost per month (₹) (D × F)	-	1,425

3. Amortized cost of Tyre replacement

	Particulars	CNG Car	EV Car
A.	Life of vehicle	15 years	10 years
B.	Replacement interval	5 years	5 years
C.	No. of time replacement required	2 times	1 time
D.	Cost of tyres for each replacement (₹)	16,000	16,000
E.	Total replacement cost (₹) (C × D)	32,000	16,000
F.	Cost per month (₹) [E ÷ (A × 12)]	177.78	133.33

4. Amortized cost of Battery replacement

	Particulars	CNG Car	EV Car
A.	Life of vehicle	15 years	10 years
B.	Replacement interval	8 years	8 years
C.	No. of time replacement required	1 time	1 time
D.	Cost of battery for each replacement (₹)	12,000	5,40,000
E.	Total replacement cost (₹) (C × D)	12,000	5,40,000
F.	Cost per month (₹) [E ÷ (A × 12)]	66.67	4,500

Statement of Operating Cost

Particulars	CNG Car (₹)	EV Car (₹)
Fixed Cost:		
Depreciation (working note - 1)	4,583.33	10,000
Driver's Salary	20,000	20,000
Garage rent	4,500	4,500
Total Fixed Cost (A)	30,583.33	36,000
Variable Cost:		
Fuel cost / power cost (Working note – 2)	4,500	1,425
Total Variable Cost (B)	4,500	1,425
Maintenance Cost:		
Annual maintenance cost	666.67	433.33
Annual insurance cost	633.33	1,216.67
Amortized cost of tyres replacement (working note – 3)	177.78	133.33
Amortized cost of battery replacement (working note – 4)	66.67	4,500
Total Maintenance Cost (C)	1,544.45	62,83.33
Operating cost per month (A + B + C)	**36,627.78**	**43,708.33**

27.

(a) Calculation of Operating Cost per month for each vehicle

	Ramgarh	Pratapgarh	Devgarh
A. Running Costs:			
- Cost of diesel (W. Note- 2)	1,25,280	70,992	92,800
- Servicing cost (W. Note- 3)	9,000	---	3,000
	1,34,280	70,992	95,800
B. Fixed Costs:			
- Salary to drivers	72,000 (4 drivers × ₹18,000)	54,000 (3 drivers × ₹18,000)	90,000 (5 drivers × ₹18,000)
- Salary to cleaners	44,000 (4 cleaners × ₹11,000)	33,000 (3 cleaners × ₹11,000)	55,000 (5 cleaners × ₹11,000)
- Allocated garage parking fee	5,400 (4 vehicles × ₹1,350)	4,050 (3 vehicles × ₹1,350)	6,750 (5 vehicles × ₹1,350)
- Depreciation (W. Note- 4)	36,733	32,800	38,542
- Toll tax passes	2,850	3,020	---
	1,60,983	1,26,870	1,90,292
Total [A + B]	2,95,263	1,97,862	2,86,092
Operating cost per vehicle	73,815.75 (₹2,95,263÷4vehicles)	65,954 (₹1,97,862÷3vehicles)	57,218.40 (₹2,86,092÷5vehicles)

(b) Vehicle operating cost per litre of milk

$$= \frac{\text{Total Operating Cost per month}}{\text{Total milk carried month}} = \frac{2,95,263 + 197,862 + 2,86,092}{1,47,00,000} = ₹0.053$$

Working Notes:

1. Distance covered by the vehicles in a month

Route	Total Distance (in K.M.)
Ramgarh (4 vehicles × 3 trips × 2 × 24 km. × 30 days)	17,280
Pratapgarh (3 vehicles × 2 trips × 2 × 34 km. × 30 days)	12,240
Devgarh (5 vehicles × 2 trips × 2 × 16 km. × 30 days)	9,600

2. Cost of diesel consumption

	Ramgarh	Pratapgarh	Devgarh
Total distance travelled (K.M.)	17,280	12,240	9,600
Mileage per litre of diesel	8 kmpl	10 kmpl	6 kmpl
Diesel consumption (Litre)	2,160 (17,280 ÷ 8)	1,224 (12,240 ÷ 10)	1,600 (9,600 ÷ 6)
Cost of diesel consumption @ ₹58 per litre (₹)	1,25,280	70,992	92,800

3. Servicing Cost

	Ramgarh	Pratapgarh	Devgarh
Total distance travelled (KM)	17,280	12,240	9,600
Covered under free service warranty	No	Yes	No
No. of services required	3 (17,280 km ÷ 5,000 km)	2 (12,240 km ÷ 5,000 km)	1 (9,600 km ÷ 5,000 km)
Total Service Cost (₹)	9,000 (₹3,000 × 3)	---	3,000 (₹3,000 × 1)

4. Calculation of Depreciation

	Ramgarh	Pratapgarh	Devgarh
No. of vehicles	4	3	5
Cost of a vehicle	11,02,000	13,12,000	9,25,000
Total Cost of vehicles	44,08,000	39,36,000	46,25,000
Depreciation per month	36,733 $\left(\frac{44,08,000 \times 10\%}{12 \text{ months}}\right)$	32,800 $\left(\frac{39,36,000 \times 10\%}{12 \text{ months}}\right)$	38,542 $\left(\frac{46,25,000 \times 10\%}{12 \text{ months}}\right)$

5. Total volume of Milk Carried

Route	Milk Qty. (Litre)
Ramgarh (25,000 ltr. × 0.7 × 4 vehicles × 3 trips × 30 days)	63,00,000
Pratapgarh (25,000 ltr. × 0.7 × 3 vehicles × 2 trips × 30 days)	31,50,000
Devgarh (25,000 ltr. × 0.7 × 5 vehicles × 2 trips × 30 days)	52,50,000
	1,47,00,000

28. (a) Operating Cost Sheet for the month of October

Particulars	Amount
A. Fixed Charges:	
Manager's salary: ₹30,000 × $\frac{60}{100}$	18,000
Drivers' Salary: ₹4,000 × 30	1,20,000
Helpers' wages: ₹2,000 × 25	50,000
Labourer wages: ₹1,500 × 20	30,000
Insurance: $\frac{₹24,000}{12}$	2,000
Road licence: $\frac{₹60,000}{12}$	5,000
Garage rent: $\frac{₹90,000}{12}$	7,500
Transport Technical Service Charges	
Depreciation	10,000
Consumable Stores (assumed fixed)	2,00,000
Electricity and Gas charges	45,000
Share in workshop expenses	28,000
Total (A)	5,20,500
B. Variable Charges:	
Cost of diesel	12,60,000
Lubricant, Oil etc.	23,500
Replacement of Tyres, Tubes & other parts	1,25,000

Particulars	Amount
Total (B)	14,08,500
C. Total Cost (A + B)	19,29,000
D. Total Ton- Kms.	18,86,400
E. Cost per ton-km. (C/D)	1.0228

(b) Calculation of chargeable Freight

Cost per ton-km.	₹1.0228
Add: Profit @ 25% on freight or 33 1/3% on cost	₹0.3409
Chargeable freight per ton-km.	₹1.3637 or ₹1.36

Workings:

1. **Cost of Diesel:**
   Distance covered by each vehicle during October = 200 × 2 × 25 × 90/100 = 9,000 km.
   Consumption of diesel = $\frac{9,000 \times 20}{5}$ = 36,000 litres.
   Cost of diesel = 36,000 × ₹35 = ₹12,60,000.
2. **Calculation of total ton-km:**
   Total Ton-Km. = Total Capacity × Distance covered by each vehicle × Avg. Capacity Utilization ratio
   = [(5 × 9) + (6 × 12) + (7 × 15) + (2 × 20)] × 9,000 × $\frac{(90\% + 70\%)}{2}$
   = (45 + 72 + 105 + 40) × 9,000 × 80% = 262 × 9,000 × 80% = 18,86,400 ton-km.

29. Operating Cost Sheet

Fixed Costs:	**Per Four Weeks**
Garage rent (150 × 4)	600
Insurance ($\frac{6,500}{52 \text{ weeks}}$ × 4 weeks)	500
License cost ($\frac{1,300}{52 \text{ weeks}}$ × 4 weeks)	3,200
Other overhead ($\frac{41,600}{52 \text{ weeks}}$ × 4 weeks)	
Total	4,400
Variable Costs:	
Petrol cost*	5,200
Oil expenses	400
Driver's wages	1,600
Repairs	400

Tyre cost ($\frac{₹6,250 \times 3,200 * km.}{25,000 km.}$)	800
Depreciation ($\frac{₹4,50,000 - 50,000}{80,000}$) × 3,200* km.	16,000
Total	24,400
Total Cost (Fixed + Variable)	28,800

Cost per km. = ₹28,800 ÷ 3,200 km. = ₹9

Cost per tonne km. = $\frac{₹28,800}{*16,000 \text{ tonnes - km.}}$ = ₹1.80

***Working Note:** Petrol cost for four weeks is computed as follows:

Kms. travelled = 40 km. × 2 return trip × 2 trips × 20 days = 3,200 km.

Total consumption of petrol in four weeks = $\frac{3,200 km.}{8 km.}$ = 400 litres.

Cost of petrol 400 litres @ ₹13 = ₹5,200

Total tonne-km = 40 kms × 2 trips × 20 days × 10 tonnes = 16,000 tonne kms.]

30.

(i) Calculation of Absolute Ton-km for the next month:

Journey	Distance in km	Weight-Up (in MT)	Ton-km	Weight-Down (in MT)	Ton-km	Total
	(a)	(b)	(c) = (a) × (b)	(d)	(e) = (a) × (d)	(c) + (e)
Delhi to Kochi	2,700	14	37,800	6	16,200	54,000
Delhi to Guwahati	1,890	12	22,680	0	0	22,680
Delhi to Vijayawada	1,840	15	27,600	0	0	27,600
Delhi to Varanasi	815	10	8,150	0	0	8,150
Delhi to Asansol	1,280	12	15,360	4	5,120	20,480
Delhi to Chennai	2,185	10	21,850	8	17,480	39,330
Total	10,710	73	1,33,440	18	38,800	1,72,240

Total Ton-Km =1,72,240 ton-km

(ii) Calculation of cost per ton-km:

Particulars		Amount (₹)	Amount (₹)
A.	Running cost:	4,11,264.00	
	- Diesel Cost {₹19.20 × (10,710 × 2)}		
	Engine oil cost $\left(\frac{₹4,200}{13,000\ km} \times 21,420\ km\right)$	6,920.31	
	Cost of loading of goods (₹ 180 × (73 + 18)}	16,380.00	
	Depreciation {(30,00,000/720,000 × 21,420 km) × 4}	3,57,000.00	7,91,564.31
B. Repairs & Maintenance Cost (36,000/10,000 × 21,420)			77,112.00
C. Standing Charges			
	- Drivers' salary (₹24,000 × 4 trucks)	96,000.00	
	Cleaners' salary (₹15,000 4 trucks)	60,000.00	
	- Supervision and other general exp.	14,000.00	1,70,000.00
Total Cost (A + B + C)			10,38,676.31
Total ton-km			1,72,240
Cost per ton-km			6.03

31. Statement of Operating Cost

Particulars	Amount (₹)
Fixed Cost:	
Plant supervision	3,00,000
Administration overheads	20,00,000
Depreciation (2,00,00,000 × 5%)	10,00,000
Total Fixed Cost (A)	33,00,000
Variable Cost:	
Operating labour	15,00,000
Lubricants, spares and stores	4,00,000
Repair & Maintenance	5,00,000
Coal [(20,00,000 ¸ 5) × 4.25)	8,50,000
Total Variable Cost (B)	32,50,000
Total Cost (A + B)	65,50,00,000
Kwh	10,00,000
Cost per kwh	6.55

32. Estimated power generated in a year = 1000 megawatt × 85% × 365 days = 3,10,250 Megawatt

Calculation of 1kW power generation cost

	Cost particulars	Amount (₹)
A	Employee cost per year	2500 lakhs
B	Solar panel maintenance cost per year	250 lakhs
C	Site maintenance cost per year	150 lakhs
D	Depreciation per year	5940 lakhs
E	Total Cost	8840 lakhs
F	Estimated power generated (in Megawatt)	3,10,250
G	Cost of generating 1 Megawatt [(E ¸ F) × 1,00,000]	2,849.31
H	Cost of 1kW (G ¸ 1,000)	2.849

33. Number of patient days = (200 × 50) + (105 × 30) + (60 × 20) + 250 = 14,600 patient days

Statement showing Profit

Particulars	Amount (₹)
Variable Cost:	
Food and Laundry Service	39,53,000
Medicines to Patients	22,75,000
Doctor's Payment	66,00,000
Hire charges of Bed (250 × ₹950)	2,37,500
Total Variable Cost (A)	1,30,65,500
Fixed Cost:	
Building Rent	27,00,000
Manager's Salary (₹5,000 × 3 × 12)	18,00,000
Nurse's Salary (₹18,000 × 12 × 24)	51,84,000
Ward boy's Salary (₹9,000 × 12 × 24)	25,92,000
Administrative Overheads	28,00,000
Depreciation on Equipment's	12,75,000
Total Fixed Cost (B)	1,63,51,000
Total Cost (A + B)	2,94,16,500
Revenue (14,600 × ₹2,500)	3,65,00,000
Profit (C)	70,83,000
Patient days (D)	14,600
Profit per patient day (C ÷ D)	485.17

$$\text{Contribution per patient day} = \frac{3,65,00,000 - 1,30,65,500}{14,600} = ₹1,605.10$$

Break-even point = $\frac{1,63,51,000}{1,605.10}$ = 10,186.90 or say 10,187 patient day

34. Working Note:

S. No.	Type of vehicles	Daily traffic volume	Weight	Ratio	Equivalent Two wheeler
1	Two Wheelers	44,500	0.05	1	44,500
2	Car and SUVs	3,450	0.20	4	13,800
3	Bus and LCV	1,800	0.30	6	10,800
4	Heavy Commercial Vehicles	816	0.45	9	7,344
	Total				76,444

(a) Calculation of total project cost per day

Activities	Amount (₹in lakhs)
Site clearance	170.70
Land development and filling work	9,080.35
Sub base and base courses	10,260.70
Bituminous work	35,070.80
Bridge, Flyovers, underpass, Pedestrian subway, footbridge etc.	29,055.60
Drainage and protection work	9,040.50
Traffic sign, marking and road appurtenance	8,405.00
Maintenance, repairing and rehabilitation	12,429.60
Environmental management	982.00
Total Project Cost	1,14,495.25
Administration and toll plaza operation cost	1,120.00
Total Cost	1,15,615.25
Concession period in days (25 years × 365 days)	9,125
Cost per day of concession period (₹in lakhs)	12.67

(b) Computation of toll fee

Cost to be recovered = Cost per day + 15% profit on cost
= 12,67,000 + 1,90,050 = ₹14,57,050

Cost per equivalent two-wheeler vehicle = $\frac{14,57,050}{76,444}$ = ₹19.06

Vehicle type wise toll fee:

S. No.	Type of vehicles	Equivalent cost	Weight	Toll fee per vehicle
1	Two Wheelers	19.06	1	19.06
2	Car and SUVs	19.06	4	76.24
3	Bus and LCV	19.06	6	114.36
4	Heavy Commercial Vehicles	19.06	9	171.54

35.

Particulars	Vehicle Loan Applications (₹)	Education Loan Applications (₹)	Total (₹)
Employee Cost	50,000 × 4 = 2,00,000	70,000 × 2 = 1,40,000	3,40,000
Apportionment of branch manager's salary	27,000	27,000	54,000
Legal charges, printing & stationary and advertising	18,000	18,000	36,000
Other expenses	3,000	3,000	6,000
Total cost	**2,48,000**	**1,88,000**	**4,36,000**

(a) Cost of processing vehicle loan application = $\frac{\text{Total cost}}{\text{No. of applications}} = \frac{2,48,000}{496} = ₹500$

(b) Cost of processing education loan application = $\frac{\text{Total cost}}{\text{No. of applications}}$

$500 = \frac{1,88,000}{\text{No. of applications}}$

No. of applications = $\frac{1,88,000}{500} = 376$

36.

(i) Total Cost = Total insured value × Cost per rupee of insured value
Total Cost = ₹3,500 crore × 0.002
Total Cost = ₹7,00,00,000
Other Cost + IT Cost = 7,00,00,000
4,79,00,000 + IT Cost = 7,00,00,000
IT Cost = ₹2,21,00,000

Statement of Cost

Particulars	Amount
Marketing and Sales Support:	
Cost of marketing the policy	1,38,90,000
Policy development cost	35,00,000
Sales support expenses	32,00,000
Total (A)	**2,05,90,000**
Operations Cost:	
Claim management cost	3,80,000
Policy issuance cost	29,50,000
Policy servicing cost	96,45,000
Total (B)	**1,29,75,000**

Particulars	Amount
IT Cost:	
IT Cost	2,21,00,000
Total (C)	**2,21,00,000**
Support Function:	
Office administration cost	48,00,000
Employees' cost	16,20,000
Postage and logistics	32,40,000
Facilities cost	46,75,000
Total (D)	**1,43,35,000**
Total Cost (A + B + C + D)	**7,00,00,000**
Number of Policies	2,800
Cost per policy	**25,000**

37.

Computation of Effective room days

Season = (200 rooms × 80%) × (6 × 30) days	28,800
Off-season = (200 rooms × 40%) × (6 × 30) days	14,400
	43,200

Computation of Total Cost			₹
(1) Staff Salary			8,00,000
(2) Repairs to buildings			3,00,000
(3) Laundry charges			1,40,000
(4) Interior charges			2,50,000
(5) Miscellaneous Expenses			2,00,200
(6) Depreciation			
Building (5% × 300,00,000 × 80%)	12,00,000		
Furniture & equipment (15% × 300,00,000 × 20%)	9,00,000		21,00,000
(7) Attendant's Salary (43,200 × 15)			6,48,000
(8) Lighting Charges			
Season (28,800 days × ₹3.67) [₹110 p.m. means ₹110÷30 = ₹3.67 per day]			1,05,696
Off-Season			
Winter (14,400 × 4/6 × ₹1) [₹30 p.m. means ₹30÷30 = ₹1 per day] (4 months)			9,600
Balance (14,400 × 2/6 × ₹3.67) (2 months)			17,616
Total Cost			45,71,112

Computation of Total Revenue	₹
Total Cost	45,71,112
(+) Profit (20% of revenue) (45,71,112 × 20/80)	11,42,778
Total Revenue	57,13,890

Assume Rent per room per day during Season is ₹Y & during off season is ₹Y/2
Hence, total annual revenue = 28,800Y + 14,400(Y/2) = 26,000Y
Now, 36,000Y = ₹57,13,890
Y = 158.72
Hence, Rent per room per day
During Season = Y = ₹158.72
During off-season = [Y/2] = ₹[158.72 ÷ 2] = ₹79.36

38. Total room days = Occupancy in normal season + Occupancy in off-season
= (20 rooms × 80% × 8 months × 30 days) + (20 rooms × 50% × 4 month × 30 days)
= 5,040 room days
(a) Total cost = Variable cost + fixed cost = (500 × 5,040) + 53,25,000 = ₹78,45,000
Total trariff or revenue = 78,45,000 + 25% = ₹98,06,250

$$\text{Tariff rate per room day} = \frac{98,06,250}{5,040} = ₹1,945.68$$

(b) Contribution per room day = 1,945.68 – 500 =₹1,445.68

$$\text{Total Break-even point} = \frac{\text{Total fixed cost}}{\text{Contribution per room day}} = \frac{53,25,000}{1,445.68} = 3,683$$

Occupacy in normal season = Ttoal break-even – Occupancy in off-season
= 3,863 – (20 rooms × 50% × 4 months × 30 days

$$= \text{In percentage} = \frac{2,483}{4,800} \times 100 = 51.73\%$$

39. Total Cost = ₹5,25,00
Tonnes km carried = 6,55,000

$$\text{Unit cost} = \frac{5,25,000}{6,55,000} = ₹0.801$$

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CHAPTER 13

Standard Costing

Standard Cost	• It is the pre-determined cost based on technical estimates for materials, labour and overheads for a selected period of time for a prescribed set of working conditions. • It may be used as a basis for price fixation and for cost control through variance analysis. • These costs provide for normal wastage, normal break down, normal idle capacity, etc. • Standard costs are generally established by cost and management accountants in consultation with relevant technical experts and management.
Types of Standards	• **Basic/Fixed/Static/Bogey Standard** - It is a standard which is established for some base year and remain in use for a long period of time. Variances from basic standards indicate the trends of deviations of actual cost from the basic cost. It has no practical utility from the point of view of cost control. • **Current Standard -** It is a standard which is established for a limited period and is related to current conditions. These standards call for periodical review and frequent revisions. These standards are easily understood and have proved most useful for managerial control. • **Ideal/Theoretical Standard -** It is a standard which is based on perfect performance without making any allowance for unavoidable losses (e.g. Normal idle time, normal waste/scrap/defectives/spoilage etc.). It is merely a theoretical standard which is unrealistic and unattainable. Variances from ideal standard generally indicate unfavorable deviations. • **Expected/Attainable/Practical Standard -** It is a standard which is based on expected performance after making a reasonable allowance for unavoidable losses (e.g. Normal Idle Time, Normal Waste/ Scrap/Defectives/Spoilage etc.). It is realistic and attainable standard. Variances from the expected standard indicate real deviations from the attainable performance. • **Normal Standard -** It is a standard which is based on average performance in the past. It is attainable under normal conditions. The main purpose of normal standard is to eliminate variations in the cost arising out of trade cycles. • **Historic Standard -** It is the average standard of past achievement. It may not be adopted as past performances including inefficiencies. However, it is useful for establishing a standard costing system.

Standard Costing	• It is a technique which establishes predetermined estimates of the costs of products and services known as standard costs and then compares these predetermined costs with actual costs as they are incurred. • The difference between the standard cost and actual cost is known as a variance which is analyzed to their causes and points of incidence.
Process of Standard Costing	• **Setting of standards** – The first step is to set standards which are to be achieved for each element of cost. • **Ascertainment of actual cost** – Actual costs are to be ascertained from books of accounts, vouchers etc. for each element of costs. • **Comparison** – Actual costs are to be compared with standard cost to find out the difference between the two known as variance. • **Analysis of variance –** Variances are further investigated to find out the actual reason for their occurrence and for identifying the appropriate actions to be taken for future. • **Disposition of variance –** Variances are disposed off by transferring it to the relevant accounts as per the accounting method adopted.
Advantages of Standard Costing	• **Facilitates Planning –** Standard costing facilitates planning since setting up of standard involves careful analysis and scrutiny of different activities of a business. • **Facilitates effective Delegation of Authority –** Delegation of authority becomes effective since the people concerned know what they have to achieve and by what standard they will be judged. • **Facilitates Cost Control –** Standard costs facilitates cost control by revealing exact degree of efficiency in various operations through comparison of actual figures with standard figures and also by revealing exact causes of deviation of actual figures from standard figures through variance analysis. • **Facilitates Motivation –** Standard costing facilitates motivation through standards which provide incentive and motivation to attain standard output of standard quality. Workers who attain standard output may be rewarded. This increases efficiency and productivity. • **Facilitates Objective Measurement of Performance –** Right person can be rewarded & promoted since performance can be judged objectively. • **Facilitates coordination -** Standard costing facilitates co-ordination between different functions by bringing different functions such as purchasing, production, selling, accounting together while fixing standards. • **Facilitates the formulation of pricing policies –** Standard costing facilitates the formulation of pricing policies for prospective orders.

	• **Facilitates cost reporting –** Standard costing through variance analysis provides a ready means of interpretation of information for the management for the purpose of control and decision making. Ready reporting enhances the value of reports. • **Projection of Profits –** System of standard costing facilitates projections regarding costs for various types of production. The techniques developed for controlling costs also contribute to better management of revenues and making reliable projection regarding profits. • **Facilitates the use of MBE principle –** Standard costing facilitates the used of management by exception (MBE) principle since the management need to concentrated only on the areas and problems which require its attention through study of variance analysis. • **Provides Economical means of Costing –** Standard costing provides economical means of costing in the sense that once the standards have been fixed some records can be kept in quantities only. This eliminates much clerical effort in pricing and balancing items on stock ledger card. The standard cost of goods produced can be calculated immediately just by multiplying the quantity by the unit standard cost. • **Cost consciousness –** Standard costing creates cost consciousness among executives which increases efficiency and productivity.
Limitations of Standard Costing	• **Setting of Accurate Standards –** It is difficult to fix accurate standard costs. Standards may be either too strict or too liberal. Inaccurate and unreliable standards do more harm than benefits. • **Revision of Standards –** Standards require revision because business conditions constantly keep on changing. Revision of standards is costly and some firms ignore it. • **Adverse Effect on Morale & Motivation –** Non-achievement of unrealistic standards may have an adverse effect on the morale and motivation of the employees. • **Duplication –** Where the system has not yet been fully accepted, there is duplication in recording in as much as inventory pricing etc. have to be done both at standard and actual price. • **Expensive –** In case of small concerns it is expensive to operate standard costing system. • **Non facilitate cost reduction –** Standard costing facilitates only cost control and not cost reduction. • **Unsuitability –** Standard Costing system is costly and unsuitable in job-order industries where the production is of non-repetitive nature. • **Difficulty in setting standards –** Sometimes it becomes difficult to set up standard costs in view of the uncertain economic conditions, great fluctuations in prices.

Setting of standard cost	• Extreme care is required to be taken in the establishment of standards because the success of standard cost system depends on the accuracy and reliability of these standards. • For setting standards, routines and process of working conditions are thoroughly studied. • Work studies and motion studies are conducted and different tests are carried out to ensure that standards are realistic and conform to management's view of efficient operations and relevant expenditure.
Standard Hour	• Standard hour is a hypothetical hour which represents the amount of work which should be performed in one hour under stated conditions. • In other words, standard hour is the quantity of output or amount which should be performed in one hour. $\text{Standard Hours} = \frac{\text{Actual Output}}{\text{Standard output per hour}}$
Variance Analysis	• The difference between standard and actual is known as variance. • Variance analysis is the process of analyzing variances by sub-dividing the total variance in such a way that management can assign responsibility for any deviation from standard performance. • Controllable variance is one which is amendable to control by a particular individual or departmental who is responsible for the variance such as excess material usage, etc. • An uncontrollable variance is one which is not amendable to control by a particular individual or departmental head. Such a variance is caused by external factors such as fluctuations in market prices, etc. • Any variance which increases the actual profit is favourable (F) or credit variance. • Any variance which decreases the actual profit is unfavourable (U) or adverse variance.
Types of direct material variances	• Material variances mainly arise due to the efficiency or inefficiency in the use of materials and/or change in actual price and standard price of materials.
Direct Material Cost Variance (MCV)	• It is the difference between the standard cost of direct materials specified for the output achieved and the actual cost of direct materials consumed. • It arises due to change in price of material, or change in quantity of material, or change in price and quantity of material. MCV = Standard material cost for actual output - Actual cost of material consumed = (SQ × SP) – (AQ × AP)
Direct Material Price Variance (MPV)	• It is that portion of the material cost variance which is due to the difference between the standard price specified and the actual price paid. MPV = (Standard price – Actual price) × Actual Quantity

Causes of material price variance (MPV)	• Change in the market prices of materials • Failure to purchase the specified quality, thereby resulting in a different price being paid • Change in the quantity of materials purchased, thereby leading to lower/ higher quantity discount • Not availing cash discounts, when standards set took into account such discounts • Inefficient purchasing • Change in the delivery costs • Rush purchases • Purchase of a substitute material on account of non-availability of the material specified • Change in the rate of excise duty, purchase tax etc. • Off-season purchasing for certain seasonal products like jute, cotton etc.
Direct Material Usage Variance (MUV)	• It is that portion of the material cost variance which is due to the difference between the standard quantity specified and the actual quantity consumed. MUV = (Standard quantity for actual output – Actual quantity) × Standard Price
Causes of material usage variance (MUV)	• Use of non-standard materials • Use of non-standard material mixture • Use of substitute material • Inefficiency in the use of materials • Change in the quality of materials • Change in the design or specification of the product • Change in the method of production • Yield from materials in excess of or less than standard yield • Pilferage • Defect in plant and machinery
Direct Material Mix Variance (MMV)	• It is that portion of the material usage variance which is due to the difference between standard and actual composition of materials. It may arise in industries like chemicals, rubber etc. where a number of raw materials are mixed to produce a final product. MMV = (Revised Standard Quantity – Actual Quantity) × Standard Price where, Revised Standard Quantity (RSQ) = Standard quantity for total actual mix $= \frac{\text{Standard quantity of one material}}{\text{Total standard quantities of all materials}} \times \text{Total actual quantity of one material}$
Causes of material mix variance (MMV)	• It arises only when the actual two or more materials are mixed in a ratio different from the standard material mix ratio. • Change from standard mix may be due to the non-availability of one or more components of material mix.

Direct Material Yield Variance (MYV)	• It is that portion of the material usage variance which is due to the difference between standard yield specified for actual quantity used and actual yield obtained. • It is an output variance which represents a gain or loss on output in terms of finished production. MYV = (Actual Yield – Standard Yield) × Standard output price
Causes of direct material yield variance (MYV)	• Lack of due care in handling • Lack of proper supervision • Defective methods of operation • Improper equipments, tools etc. • Sub-standard quality of materials-fault of purchase department
Labour Variances	• Labour variances mainly arise due to the efficiency or inefficiency in the use of labour hours and/or change in actual rate and standard rate of labour.
Direct Labour Cost Variance (LCV)	• It is the difference between the standard cost of direct labour hours specified for the output achieved and the actual cost of direct labour hours expended. LCV = Standard labour cost of actual output – Actual labour cost = (Standard hours for actual output × Standard rate) – (Actual hours × Actual Rate)
Direct Labour Rate Variance (LRV)	• It is that portion of the labour cost variance which is due to the difference between the standard rate specified and the actual rate paid. LRV = (Standard Rate – Actual Rate) × Actual Hours
Causes for labour rate variances (LRV)	• Change in the basic wage rates • Change in the method of wage payment • Use of grades of labour different from the standard grade specified • Unscheduled overtime • New workers not being paid at full rates
Direct Labour Efficiency Variance (LEV)	• It is that portion of that labour cost variance which is due to the difference between labour hours specified for actual output and the actual labour hours expended. LEV = (Standard hour for actual output – Actual hours) × Standard price
Causes of labour efficiency variance (LEV)	• Use of non-standard grade of workers • Use of standard grade of workers but workers are inefficient • Use of defective method of operation • use of defective or non-standard materials • Use of defective tools and plant and machinery • Poor working conditions e.g. inadequate lighting etc. • Incompetent supervision

Direct Labour Mix Variance (LMV) or Gang Composition Variance	• It is that portion of the labour efficiency variance which is due to the difference between standard and actual composition of labour. LMV = (Revised standard hours – Actual hours) × Standard rate
Direct Labour Yield Variance (LYV)	• It is that portion of the labour efficiency variance which is due to the difference between standard yield specified for actual hours used and actual yield obtained. • It is an output variance which represents a gain or loss on output in terms of finished production. LYV = (Actual Yield – Standard Yield) × Standard labour cost per unit of output
Idle time variance (ITV)	• It is that portion of labour efficiency variance which is due to abnormal idle time such as time lost due to power failure, machinery break-down, strike etc. • It arises due to the difference between actual labour hours worked and actual labour hours paid. ITV = Idle Hours × Standard Rate
Causes for idle time variance	• Break-down of plant and machinery • Sub-optimal condition of equipments • Inappropriate equipment • Poor placement of workers • Delay in giving production instructions • Changes in methods of production • Improper supervision in the factory • Too frequent changes in workers work • Power failure
Overhead Cost Variance (OCV)	• It is the difference between total standard overhead absorbed and total actual overhead incurred. It indicates under or over absorption of overheads. OCV = Absorbed overhead – Actual overhead = (Std. hours × Std. overhead rate) – Actual overhead
Variable Overhead Cost Variance (VOCV)	• It is the difference between absorbed variable overhead and actual variable overhead incurred. • It indicates under or over absorption of variable overheads.
Variable Overhead Expenditure /Spending/Budget Variance (VOBV)	• This variance arises due to the difference between standard variable overhead allowed and actual variable overhead incurred. • It will represent the difference between actual hours worked at standard variable overhead rate and actual variable overhead incurred during the period.

Variable Overhead Efficiency Variance (VOEV)	• It is that portion of total variable overheads cost variance which arises due to the difference between standard hours for actual output (SH) and actual hours (AH). • If actual hours worked are less than standard hours, the VOEV is favourable, and vice-versa. VOEV = (Std. hours for actual output – Actual hours) × Std. variable overhead rate
Fixed Overhead Cost Variance (FOCV)	• It is the difference between total standard fixed overhead absorbed and total actual fixed overhead incurred. • It indicates under or over absorption of fixed overheads. FOCV = Absorbed overhead – Actual overhead = (Std. hours for actual output × standard rate) – Actual overhead
Fixed Overhead Expenditure Variance (FOEV)	• It is that portion of total fixed overhead variance which arises due to the difference between budgeted fixed overhead and actual fixed overheads. It indicates under or over spending of fixed overheads. FOEV = Budgeted fixed overhead – Actual fixed overhead
Causes of fixed overhead expenditure variance	• Seasonal conditions • improper use of available facilities • Use of efficient tools and equipments • Improperly set standards • Rise in price due to inflation • Change in methods of operation
Fixed Overhead Volume Variance (FOVV)	• It is that portion of total fixed overhead cost variance which arises due to the difference between standard hours for actual output and budgeted hours. • Adverse fixed overhead volume variance indicates unabsorbed portion of fixed overheads because of underutilization of capacity. FOVV = (Std. hours for actual output – Budgeted hours) × Std. rate
Causes for fixed overhead volume variance	• Power failure • machine breakdown • Waiting for tools, work, instructions, machine, materials etc. • Idle or excess capacity • Variation in customer's demands and orders booked • Labour strikes or lock-outs etc. • Working overtime due to rush orders etc. • Defective scheduling and routing of production
Fixed Overhead Efficiency Variance (FOEV)	• It is that portion of fixed overhead volume variance which arises due to the difference between standard hours for actual output and actual hours. • It indicates the increased or reduced output arising from efficiency above or below the standard which is expected. FOEV = (Std. hours for actual output – Actual hours) × Std. rate

Causes for fixed overhead efficiency variance	• Poor working conditions • Poor supervision • Poor scheduling of production processes • Frequent power failures • Improperly set standards
Fixed Overhead Capacity Variance (FOCV)	• It is that portion of fixed overhead volume variance which arises due to the difference between actual hours and budgeted hours. It indicates working at higher or lower capacity usage than the standard. FOCV = (Actual hours worked – Budgeted hours) × Std. Rate
Causes for fixed overhead capacity variance	• Chance in scheduling of production process • Power failures • Labour troubles • Lock-out • Shortage of materials • Machine break-down • Slump in customer's demand • Decline in sales volume • Inefficient supervision • Defective material
Fixed Overhead Calendar Variance (FOCV)	• It is that portion of fixed overhead volume variance which arises due to the difference between the actual number of working days and the budgeted number of working days. • In other words, it indicates the difference between revised budgeted fixed overheads and original budgeted fixed overheads. FOCV = (Actual no. of working days – Budgeted no. of working days) × Std. rate = (Revised budgeted hours – Budgeted hours) × Std. rate
Fixed Overhead Revised Capacity Variance (FORCV)	• It is that part of fixed overhead capacity variance which is due to difference between standard fixed overheads for actual hours and fixed overheads for days available during the period at standard rate also called possible overheads. • This variance arises due to the difference between actual hours worked and days actually available during the related period. FORCV = (Actual hours – Revised budgeted hours) × Std. rate
Control Ratios	• Management also makes use of ratios in controlling operations. These ratios are generally known as control ratios. • These are used by the management to find out whether the deviations of actual from budgeted results are favorable or otherwise. • These ratios are expressed in terms of percentages. • If the ratio is 100% or more, the trend is taken as favorable. The indication is taken as unfavorable if the ratio is less than 100%.

Efficiency Ratio	• It is defined as "the standard hours equivalent to the work produced expressed as a percentage of actual hours spent in production". • Thus, this ratio shows whether actual time taken in production is more or less than the time allowed by the standard. • It can be related to Overhead Efficiency Variance or Labour Efficiency Variance. $\text{Efficiency Ratio}=\frac{\text{Standard hours for actual output}(\text{SH})}{\text{Actual hours worked}(\text{AH})}\times 100$
Activity Ratio or Production Volume Ratio	• It is defined as "the standard hours equivalent to the work produced, expressed as percentage of budgeted standard hours". • Thus this ratio shows the extent to which the production facilities have been utilized as compared with that contemplated in budgets. • It can be related to Fixed Overhead Volume Variance. $\text{Activity Ratio}=\frac{\text{Standard hours for actual output}(\text{SH})}{\text{Budgeted hours}(\text{BH})}\times 100$
Capacity Ratio	• It expresses actual hours worked as a percentage of the budgeted hours. • It indicates whether and to what extent budgeted hours of activity are actually utilized. • It can be related to Fixed Overhead Capacity Variance. $\text{Capacity Ratio}=\frac{\text{Actual hours worked}(\text{AH})}{\text{Budgeted hours}(\text{BH})}\times 100=\frac{\text{Activity Ratio}}{\text{Efficiency Ratio}}$
Calendar Ratio	• This ratio refers to the relationship between actual number of days worked during the budget period and the budgeted number of working days in the budgeted period. • It indicates the extent of actual working days availed during the budget period. • It can be related to Fixed Overhead Calendar variance. $\text{Calendar Ratio}=\frac{\text{Actual number of working days in the budgeted period}}{\text{Budgeted number of working days in the budgeted peirod}}\times 100$
Idle Capacity Ratio	• It indicates the percentage of budgeted capacity which is not actually utilized during the budget period. $\text{Idle Capacity Ratio}=\frac{\text{Budgeted Capacity - Actual Capacity}}{\text{Budgeted Capacity}}\times 100$

PRACTICAL QUESTIONS

1. A manufacturing concern which has adopted standard costing furnishes the following information:

[SM]

Standard:	Material for 70 kg of finished products	100 kg
	Price of material	₹1 per kg
Actual:	Output	2,10,000 kg
	Material used	2,80,000 kg
	Cost of materials	₹2,52,000

Calculate:

(a) Material usage variance,

(b) Material price variance

(c) Material cost variance

Ans. (a) ₹20,000 (F); (b) ₹28,000 (F); (c) ₹48,000 (F).

2. For making 10 kg of SK, the standard material requirement is: **[SM]**

Material	Quantity (Kg)	Rate per kg (₹)
A	8	6.00
B	4	4.00

During April, 1,000 kg of SK were produced. The actual consumption of materials is as under:

Material	Quantity (Kg)	Rate per kg (₹)
A	750	7.00
B	500	5.00

Calculate: (a) Material cost variance: (b) Material price variance: (c) Material usage variance

Ans. (a) ₹1,350 (A); (b) ₹1,250 (A); (c) ₹100 (A).

3. EML operates in coal mining through open cast mining method. Explosives and detonators are used for excavation of coal from the mines. The following are the details of standard quantity of explosives materials used for mining: **[RTP may 2024]**

Particulars	Rate (₹)	Standard Qty. for Iron ore	Standard Qty. for Over-burden (OB)
SME	40.00 per kg.	2.4 kg per tonne	1.9 kg per cubic- meter
Detonators	20.00 per piece	2 pcs per tonne	2 pcs per cubic- meter

The standard stripping ratio is 3:1 (means 3 cubic- meter of overburden soil to be removed to get one tonne of coal).

During the month of December 2023, the company produces 20,000 tonnes of coal and 58,000 cubic- meter of OB. The quantity of explosive materials used and paid for the month is as below:

Material	Quantity	Amount (₹)
SME	1,67,200 kg.	63,53,600
Detonators	1,18,400 pcs	24,27,200

Explosive suppliers are paid for the explosive materials on the basis of performance of the explosives which is termed as powder factor. One of the suppliers has presented their bill for explosive supplied for the month of December 2023. You being a bill passing officer of EML is required to COMPUTE the material price variance, material quantity variance and material cost variance.

Sol. MPV = 12,75,200 (F); MUV = ₹3,92,000 (F); MCV = ₹6,67,200 (F)]

4. The standard cost of a chemical mixture is as follows: **[RTP May 2024]**

40% of material A at ₹20 per kg

60% of material B at ₹30 per kg

A standard loss of 10% of input is expected in production. The cost records for a period showed the following usage:

90 kg material A at a cost of ₹18 per kg

110 kg material B at a cost of ₹34 per kg

The quantity produced was 182 kg of good product.

Calculate all material variances.

Ans. MCV = ₹102.20 (A); MPV = ₹260 (A); MUV = ₹157.70 (F); MMV = ₹100 (F); MYV = ₹57.70 (F).

5. SK Ltd. manufactures SK by mixing three raw materials. For each batch of 100 kg of SK, 125 kg of raw material are used. In June 60 batches are prepared to produce an output of 5600 kg of SK. The standard and actual particulars for June are as follows: **[SM]**

Raw materials	Standard		Actual		Quantity of raw material purchased
	Mix %	Price per kg (₹)	Mix %	Price per kg (₹)	
X	50	20	60	21	5000
Y	30	10	20	8	2000
Z	20	5	20	6	1200

Calculate all variances.

Ans. MCV = ₹17,500 (A); MPV = ₹3,000 (A); MUV = ₹14,500 (A); MMV = ₹7,500 (A); MYV = ₹7,000 (A).

6. SK Ltd. produces an article by blending two basic raw materials. The following standards have been set up for raw materials: **[SM]**

Materials	Standard Mix	Standard Price per kg
A	40%	₹5.00
B	60%	₹4.00

The standard loss in processing is 10%. During March, the company produced 2,250 kg of finished output. The position of stock and purchases for the month of March, is as under:

Materials	Stock on 1 March	Stock on 31 March	Purchase during March
A	40 kg	20 kg	800 kg for ₹4,800
B	50 kg	15 kg	1800 kg for ₹7,560

Calculate the following variances:

(a) Material price variance
(b) Material usage variance;
(c) Material yield variance
(d) Material mix variance
(e) Material cost variance.

Assume FIFO method for issue of material. The opening stock is to be valued at standard price.

Ans. (a) ₹1,137 (A); (b) ₹440 (A); (c) ₹682 (A); (d) ₹242 (F); (e) ₹1,577 (A).

7. One kilogram of product K requires two chemicals A and B. The following were the details of product K for the month of June: **[SM]**

(i) Standard mix for chemical A is 50% and chemical B is 50%.
(ii) Standard price kilogram of chemical A is ₹12 and chemical B is ₹15.
(iii) Actual input of chemical B is 70 kilograms.
(iv) Actual price per kilogram of chemical A is ₹15
(v) Standard normal loss is 10% of total input
(vi) Total material cost variance is ₹650 adverse
(vii) Total material yield variance is ₹135 adverse.

You are required to calculate:

(i) Total material mix variance
(ii) Total material usage variance
(iii) Total material price variance
(iv) Actual loss of actual input
(v) Actual input of chemical A
(vi) Actual price per kg of chemical B

Ans. (i) ₹45 (A); (ii) ₹180 (A); (iii) ₹470 (A); (iv) 20 kg; (v) 40 kg; (vi)₹20.

8. Compute the missing data indicated by the question marks from the following:

Particulars	A	B
Standard Price/Unit	₹12	₹15
Actual price/unit	₹15	₹20
Standard Input (kg)	50	?
Actual Input (kg)	?	70

Material Price variance	?	?
Material Usage variance	?	₹300 (A)
Material Cost variance	?	?

Material mix variance for both products together was ₹45 adverse

9. SK Limited operates a system of standard costing in respect of one of its products which is manufactured within a single cost centre. Following are the details: **[SM]**

Budgeted data:

Material	Quantity	Price (₹)	Amount (₹)
A	60	20	1200
B	40	30	1200
Inputs	100		2400
Normal loss	20		.
Output	80		2400

Actual Data:

Actual output 80 units

Material	Quantity	Price (₹)	Amount(₹)
A	70	?	?
B	?	30	?

Material Price Variance ₹105 (A)
Material Cost Variance ₹275 (A)

You are required to calculate:

(a) Actual price of material A
(b) Actual quantity of material B
(c) Material price variance
(d) Material usage variance
(e) Material mix variance
(f) Material sub usage variance

Ans. (a) ₹21.50; (b) 39 units; (c) ₹105 (A); (d) ₹170 (A); (e) ₹46 (F); (f) ₹216 (A).

10. The details regarding the composition and the weekly wage rates of labour force engaged on a job scheduled to be completed in 30 weeks are as follows:

Category of workers	Standard		Actual	
	No. of workers	Weekly wage rate per worker	No. of workers	Weekly wage rate per worker
Skilled	75	₹60	70	₹70
Semi-skilled	45	₹40	30	₹50
Unskilled	60	₹30	80	₹20

The work is actually completed in 32 weeks. Calculate the all labour variances.

Ans. LCV = ₹13,000 (A); LRV = ₹6,400 (A); LEV = ₹6,600 (A); LMV = ₹9,600 (F); LYV = ₹16,200 (A).

11. The standard labour component and the actual labour component engaged in a week for a job are as under:

		Skilled workers	Semi-skilled workers	Unskilled workers
(a)	Standard No. of workers in the gang	32	12	6
(b)	Standard wage rate per hour (₹)	3	2	1
(c)	Actual no. Of workers employed in the gang during the week	28	18	4
(d)	Actual wage rate per hour (₹)	4	3	2

During the 40-hour working week, the gang produced 1,800 standard labour hours of work. Calculate the different labour variance.

Ans. LCV = ₹2,424 (A); LRV = ₹2,000 (A); LEV = ₹424 (A); LMV = ₹80 (F); LYV = ₹504 (A).

12. The following standards have been set to manufacture a product of SK Ltd.: **[SM]**

Direct Material:	(₹)
2 units of A @ ₹4 per unit	8.00
3 units of B @ ₹3 per unit	9.00
15 units of C @ ₹1 per unit	15.00
	32.00
Direct labour: 3 hours @ ₹8 per hour	24.00
Total standard prime cost	56.00

The company manufactured and sold 6,000 units of the product during the year. Direct material costs were as follows:

12,500 units of A at ₹4.40 per unit

18,000 units of B at ₹2.80 per unit

88,500 units of C at ₹1.20 per unit

The company worked 17,500 direct labour hours during the year. For 2,500 of these hours, the company paid at ₹12 per hour while for the remaining, the wages were paid at standard rate. Calculate materials price variance and usage variance and labour rate and efficiency variances.

Ans. MPV = ₹19,100 (A); MUV = ₹500 (A); LRV = ₹10,000 (A); LEV = ₹4,000 (F).

13. The standard output of 'S' is 25 units per hour in a manufacturing department of a company employing 100 workers. The standard wage rate per labour hour is ₹6.

[SM, Similar May 2022, Similar July 2021]

In a 42 hour week, the department produced, 1,040 units of 'S' despite 5% of the time paid was lost due to abnormal reasons. The hourly rate actually paid were ₹6.20, ₹6 and ₹5.70 respectively to 10, 30 and 60 workers. Compute relevant variances.

Ans. LCV = ₹432 (F); LRV = ₹672 (F); LEV = ₹1,020 (F); Idle time var. = ₹1,260 (A).

14. From the particulars given below, compute:

(a) Material price variance

(b) Material usage variance

(c) Labour rate variance

(d) Idle time variance and

(e) Labour efficiency variance with full working details.

One tonne of materials input yields a standard output of 1,00,000 units. The standard price of material is ₹20 per kg. Number of employees engaged is 200. The standard wage rate per employee per day is ₹6. The standard daily output per employee is 100 units. The actual quantity of material used is 10 tonnes and the actual price paid is ₹21 per kg. Actual output obtained is 9,00,000 units. Actual number of days worked is 50 and actual rate of wages paid is ₹6.50 per day. Idle time paid for and included in above time is ½ day.

Ans. (a) ₹10,000 (A); (b) ₹20,000 (A); (c) ₹5,000 (A); (d) ₹600 (A); (e) ₹5,400 (A).

15. SK Ltd. had prepared the following estimation for the month of April: **[RTP May 2020]**

	Quantity	Rate (₹)	Amount (₹)
Material – A	800 kg	45.00	36,000
Material – B	600 kg	30.00	18,000
Skilled Labour	1,000 hours	37.50	37,500
Unskilled Labour	800 hours	22.00	17,600

Normal loss was expected to be 10% of total input materials and an idle labour time of 5% of expected labour hours was also estimated.

At the end of the month the following information has been collected from the cost accounting department:

The company has produced 1,480 kg finished product by using the followings:

	Quantity	Rate (₹)	Amount (₹)
Material – A	900 kg	43.00	38,700
Material – B	650 kg	32.50	21,125
Skilled Labour	1,200 hours	35.50	42,600
Unskilled Labour	860 hours	23.00	19,780

You are required to calculate:

(a) Material cost variance
(b) Material price variance
(c) Material mix variance
(d) Material yield variance
(e) Labour cost variance
(f) Labour efficiency variance
(g) Labour yield variance

Ans. (a) ₹3,580 (F); (b) ₹175 (F); (c) ₹210 (A); (d) ₹3,615 (F); (e) ₹921 (A); (f) ₹2,462 (A); (g) ₹1,594 (A).

16. From the following information of SK Ltd.

calculate

(a) Variable overhead cost variance

(b) Variable overhead expenditure variance and

(c) Variable overhead efficiency variance

Budgeted production	6,000 units
Budgeted variable overhead	₹1,20,000
Standard time for one unit of output	2 hours
Actual production	5,900 units
Actual overhead incurred	₹1,22,000
Actual hours worked	11,600 hours

Ans. (a) ₹4,000 (A); (b) ₹6,000 (A); (c) ₹2,000 (F).

17. SK Ltd. uses standard costing system in manufacturing of its product 'Mask'. The details are as follows: **[SM]**

Direct material	0.50 meter @ ₹60 per meter	₹30
Direct labour	1 hour @ ₹20 per hour	₹20
Variable overhead	1 hour @ ₹10 per hour	₹10
Total		₹60

During the month of August, 10,000 units of 'Mask' were manufactured. Details are as follows:

Direct material consumed	5700 meters @ ₹58 per meter	
Direct labour hours	? @ ?	₹2,24,400
Variable overhead incurred		₹1,12,200

Variable overhead efficiency variance is ₹2,000 (A).

Variable overheads are based on direct labour hours

You are required to calculate the missing data and all the relevant variances.

Ans. MCV = ₹30,600 (A); MPV = ₹11,400 (F); MUV = ₹42,000 (A); VOCV = ₹12,200 (A); VO exp. = ₹10,200 (A); LCV = ₹24,400 (A); LRV = ₹20,400 (A); LEV = ₹4,000 (A)]

18. The cost details of SK Ltd. for the month of August is as follows: **[SM]**

	Budgeted	Actual
Fixed overheads	₹15,00,000	₹15,60,000
Units of production	7,500	7,800
Standard time for one unit	2 hours	-
Actual hours worked	-	16,000 hours

Required to calculate:

(a) Fixed overhead cost variance

(b) Fixed overhead expenditure variance

(c) Fixed overhead volume variance

(d) Fixed overhead efficiency variance and

(e) Fixed overhead capacity variance.

Ans. (a) Nil; (b) ₹60,000 (A); (c) ₹60,000 (F); (d) ₹40,000 (A); (e) ₹1,00,000 (F).

19. A company has a normal capacity of 120 machines, working 8 hours per day of 25 days in a month. The fixed overheads are budgeted at ₹1,44,000 per month. The standard time required to manufacture one unit of product is 4 hours. **[SM]**

In April, the company worked 24 days of 840 machine hours per day and produced 5,305 units of output. The actual fixed overheads were ₹1,42,000.

Compute:

(a) Efficiency variance

(b) Capacity variance

(c) Calendar variance

(d) Expense variance

(e) Volume variance,

(f) Total fixed overhead variance.

Ans. (a) ₹6,360 (F); (b) ₹17,280 (A); (c) ₹5,760 (A); (d) ₹2,000 (F); (e) ₹16,680 (A); (f) ₹14,680 (A).

20. The following information was obtained from the records of a manufacturing unit using standard costing system.

	Standard	Actual
Production	4,000 units	3,800 units
Working days	20	21
Machine hours	8,000 hours	7,800 hours
Fixed Overhead	₹4,00,000	₹3,90,000
Variable Overhead	₹1,20,000	₹1,20,000

You are required to calculate the following variance:

(a) Variable overhead variances

(b) Fixed overhead variances

Ans. (a) ₹6,000 (A); ₹3,000 (A); ₹3,000 (A); (b) ₹10,000 (A); ₹10,000 (F); ₹20,000 (A); ₹10,000 (A); ₹30,000 (A); ₹20,000 (F).

21. The following data has been collected from the cost records of a unit for computing the various fixed overhead variances for a period: **[SM]**

Number of budgeted working days	25
Budgeted man-hours per day	6,000

Output (budgeted) per man-hour (in units)	1
Fixed overhead cost as budgeted	₹1,50,000
Actual number of working days	27
Actual man-hours per day	6,300
Actual output per man-hour (in units)	0.90
Actual fixed overhead incurred	₹1,56,000

Calculate fixed overhead variances:

(i) Expenditure variance

(ii) Volume variance

(iii) Fixed cost variance

Ans. (i) ₹6,000 (A); (ii) ₹3,090 (F); (iii) ₹2,910 (A).

22. In a manufacturing company the standard units of production for the year were fixed at 1,20,000 units and overhead expenditures were estimated to be as follows: **[Dec 2021]**

Particulars	Amount (₹)
Fixed	12,00,000
Semi-variable (60% expenses are of fixed nature and 40% are of variable nature)	1,80,000
Variable	6,00,000

Actual production during the month of April, 2021 was 8,000 units. Each month has 20 working days. During the month there was one public holiday. The actual overheads were as follows:

Particulars	Amount (₹)
Fixed	1,10,000
Semi-variable (60% expenses are of fixed nature and 40% are of variable nature)	19,200
Variable	48,000

You are required to calculate the following variances for the month of April 2021:

(i) Overhead cost variance

(ii) Fixed overhead cost variance

(iii) Variable overhead cost variance

(iv) Fixed overhead volume variance

(v) Fixed overhead expenditure variance

(vi) Calendar variance

Ans. (i) ₹45,200 (A); (ii) ₹34,320 (A); (iii) ₹10,880 (A); (iv) ₹21,800 (A); (v) ₹12,520 (A); (vi) ₹5,450 (A).

23. The overhead expense budget for a factory producing to a capacity of 200 units per month is as follows: **[SM]**

Description of overhead	Fixed cost per unit in ₹	Variable cost per unit in ₹	Total cost per unit in ₹
Power and fuel	1,000	500	1,500
Repair & maintenance	500	250	750
Printing and stationary	500	250	750
Other overheads	1,000	500	1,500
	3,000	1,500	4,500

The factory has actually produced only 100 units in a particular month. Details of overheads actually incurred have been provided by the accounts department and are as follows:

Description of overhead	Actual Cost (₹)
Power and fuel	4,00,000
Repair & maintenance	2,00,000
Printing and stationary	1,75,000
Other overheads	3,75,000

You are required to calculate the overhead volume variance and the overhead expense variance.

Ans. Volume = ₹3,00,000 (A); Expense = ₹4,00,000 (A)

24. ABC Ltd. has furnished the following information regarding the overheads for the month of June 2020: **[Nov 2020]**

(i) Fixed overhead cost variance ₹2,800 (Adverse)
(ii) Fixed overhead volume variance ₹2,000 (Adverse)
(iii) Budgeted Hours for June, 2020 2,400 hours
(iv) Budgeted Overheads for June, 2020 ₹12,000
(v) Actual rate of recovery of overheads ₹8 per hour

From the above given information calculate:

(1) Fixed overhead expenditure variance
(2) Actual overheads incurred
(3) Actual hours for actual production
(4) Fixed overhead capacity variance
(5) Standard hours for actual production
(6) Fixed overhead efficiency variance

Ans. (1) ₹800 (A); (2) ₹12,800; (3) 1,600 hours; (4) ₹4,000 (A); (5) 2,000 hours; (6) ₹2,000 (F).

25. Following data is available for ABC Ltd.: **[May 2019]**

Standard working hours	8 hours per day of 5 days per week
Maximum capacity	60 employees
Actual working	50 employees
Actual hours expected to be worked per four week	8,000 hours
Standard hours expected to be earned per four week	9,600 hours
Actual hours worked in the four week period	7,500 hours
Standard hours earned in the four week period	8,800 hours

The related period is of four weeks. Calculate the following Ratios:

(i) Efficiency ratio
(ii) Activity ratio
(iii) Standard capacity usage ratio
(iv) Actual capacity usage ratio
(v) Actual usage of Budgeted capacity ratio

Ans. (i) 117.33%; (ii) 110%; (iii) 83.33%; (iv) 78.125%; (v) 93.75%

26. NC Limited uses a standard costing system for the manufacturing of its product 'X'. the following information is available for the last week of the month: **[May 2023]**

- 25,000 kg of raw material were actually purchased for ₹3,12,500. The expected output is 8 units of product 'X' from each one kg of raw material. There is no opening and closing inventories. The material price variance and material cost variance, as per cost records, are ₹12,500 (F) and ₹1,800 (A) respectively.
- The standard time to produce a batch of 10 units of product 'X' is 15 minutes. The standard wage rate per labour hour is 50. The company employs 125 workers in two categories, skilled and semi-skilled, in a ratio of 60:40. The hourly wages actually paid were ₹50 per hour for skilled workers and ₹40 per hour for semi-skilled workers. The weekly working hours are 40 hours per worker. Standard wage rate is the same for skilled and semi-skilled workers.
- The monthly fixed overheads are budgeted at ₹76,480. Overheads are evenly distributed throughout the month and assume 4 weeks in a month. In the last week of the month, the actual fixed overhead expenses were ₹19,500.

Required:

(a) Calculate the standard price per kg and the standard quantity of raw material
(b) Calculate the material usage variance, labour cost variance and labour efficiency variance.
(c) Calculate the fixed overhead cost variance, the fixed overhead expenditure variance and the fixed overhead volume variance.

Ans. (a) ₹13; 23,900 kg; (b) ₹14,300 (A); ₹9,000 (F); ₹11,000 (A); (c) ₹1,221 (A); ₹380 (A); ₹841 (A).

PRACTICE QUESTIONS

27. The standard and actual figures of product 'Z' are as under: **[SM]**

	Standard	**Actual**
Material quantity	50 units	45 units
Material price per unit	₹1.00	₹0.80

Calculate material cost variances.

Ans. MCV = ₹14 (F); MPV = ₹9 (F); MUV = ₹5 (F)

28. The standard mix to produce one unit of a product is as follows: **[SM]**

Material X	60 units @ ₹15 per unit	=	900
Material Y	80 units @ ₹20 per unit	=	1,600
Material Z	100 units @ ₹25 per unit	=	2,500
	240 units		5,000

During the month of April, 10 units were actually produced and consumption was as follows:

Material X	640 units @ ₹17.50 per unit	=	11,200
Material Y	950 units @ ₹18.00 per unit	=	17,100
Material Z	870 units @ ₹27.50 per unit	=	23,925
	2,460 units		52,225

Calculate all material variances.

Ans. MCV = ₹2,225 (A); MPV = ₹1,875 (A); MUV = ₹350 (A); MMV = ₹900 (F); MYV = ₹1,250 (A).

29. Following data is extracted from the books of SK Ltd. for the month of January: **[SM]**

(i) Estimation-

Particulars	Quantity (kg)	Price (₹)	Amount (₹)
Material – A	800	?	--
Material – B	600	30.00	18,000
			--

Normal loss was expected to be 10% of total input materials.

(ii) Actuals-

1,480 kgs of output produced.

Particulars	Quantity (kg)	Price (₹)	Amount (₹)
Material – A	900	?	--
Material – B	?	32.50	--
			59,825

(iii) Other information-

Material cost variance = ₹3,625 (F)

Material price variance = ₹175 (F)

You are required to calculate:

(i) Standard price of material - A

(ii) Actual quantity of material – B

(iii) Actual price of material – A

(iv) Revised standard quantity of material – A and material – B

(v) Material mix variance

Ans. (i) ₹45; (ii) 650 kg; (iii) ₹43; (iv) 886 kg; 664 kg; (v) ₹210 (A).

30. Following are the details of the product SK for the month of April:

Standard quantity of material required per unit 5kg

Actual output 1,000 units

Actual cost of materials used ₹7,14,000

Material price variance ₹51,000 (Fav)

Actual price per kg of material is found to be less then standard price per kg of material by ₹10

You are required to calculate:

(a) Actual quantity and Actual price of materials used.

(b) Material Usage Variance

(c) Material Cost Variance

Ans. (a) ₹140; (b) ₹15,000 (A); (c) ₹36,000 (F)

31. The standard and actual figures of a firm are as under: **[SM]**

Standard time for the job	1,000 hours
Standard rate per hour	₹50
Actual time taken	900 hours
Actual wages paid	₹36,000

Calculate variances.

Ans. LCV = ₹14,000 (F); LRV = ₹9,000 (F); LEV = ₹5,000 (F).

32. The standard labour employment and the actual labour engaged in a 40 hours week for a job are as under:

Category	Standard		Actual	
	No. of workers	Wage rate per hour (₹)	No. of workers	Wage rate per hour (₹)
Skilled	65	45	50	50
Semi-skilled	20	30	30	35
Unskilled	15	15	20	10

Standard output: 2000 units; Actual output: 1800 units

Abnormal idle time 2 hours in the week

Calculate:

(a) Labour cost variance (b) Labour efficiency variance

(c) Labour idle time variance

Ans. (a) ₹15,000 (A); (b) ₹3,900 (F); (c) ₹6,900 (A).

33. SK ltd. uses standard costing system for manufacturing of its product X. Following is the budget data given in relation to labour hours for manufacture of 1 unit of Product X: **[SM]**

Labour	Hours	Rate (₹)
Skilled	2	6
Semi-Skilled	3	4
Unskilled	5	3
Total	10	

In the month of January, total 10,000 units were produced following are the details:

Labour	Hours	Rate (₹)	Amount (₹)
Skilled	18,000	7	1,26,000
Semi-Skilled	33,000	3.50	1,15,500
Unskilled	58,000	4	2,32,000
Total	1,09,000		4,73,500

Actual idle hours (abnormal) during the month:

Skilled	500
Semi-skilled	700
Unskilled	800
Total	2,000

Calculate:

(a) Labour variances

(b) Also show the effect on labour rate variance if 5,000 hours of skilled labour are paid @₹5.50 per hour and the balance were paid @₹7 per hour.

Ans. (a) LCV = ₹83,500 (A); LRV = ₹59,500 (A); LEV = ₹15,800 (A); Idle time var. = ₹8,200 (A); LMV = ₹11,500 (F); LYV = ₹27,300 (A); (b) LRV = ₹52,000 (A).

34. A gang of workers normally consists of 30 skilled workers, 15 semi-skilled workers and 10 unskilled workers. They are paid at standard rate per hour as under: **[May 2019]**

Skilled	₹70
Semi-skilled	₹65
Unskilled	₹50

In a normal working week of 40 hours, the gang is expected to produce 2,000 units of output. During the week ended 31st March, 2019, the gang consisted of 40 skilled, 10 semi-skilled and 5 unskilled workers. The acutal wages paid were at the rate of ₹75, ₹60 and ₹52 per hour respectively. Four hours were lost due to machine breakdown and 1,600 units were produced.

Calculate the following variances showing clearly adverse (A) or favorable (F)

(i) Labour Cost Variance
(ii) Labour Rate Variance
(iii) Labour Efficiency Variance
(iv) Labour Mix Variance
(v) Labour Idle Time variance

Ans. (i) ₹40,000 (A); (ii) ₹6,400 (A); (iii) ₹18,800 (A); (iv) ₹4,500 (A); (v) ₹14,800 (A).

35. The following information has been provided by a company: **[RTP Nov 23]**

Number of units produced and sold	6,000
Standard labour rate per hour	₹8
Standard hours required for 6,000 units	-
Actual hours required	17,094 hours
Labour efficiency	105.3%
Labour rate variance	₹68,376 (A)

You are required to calculate:

(a) Actual labour rate per hour
(b) Standard hours required for 6,000 units
(c) Labour Efficiency variance
(d) Standard labour cost per unit
(e) Actual labour cost per unit.

Ans. (a) ₹12; (b) ₹18,000 hours; (c) ₹7,248 (F); (d) ₹24; (e) ₹34,19.

36. The following information is available from the cost records of SK Ltd. for the month of March:

[SM]

Materials purchased	20,000 units @ ₹88,000
Materials consumed	19,000 units
Actual wages paid for 4,950 hours	₹24,750
Units produced	1,800 units
Standard rates and pieces are:	
Direct material	₹4 per unit
Standard output	10 number for one unit
Direct labour rate	₹4.00 per hour
Standard requirement	2.5 hours per unit

You are required to calculate relevant material and labour variance for the month.

Ans. MCV = ₹11,600 (A); MPV = ₹7,600 (A); MUV = ₹4,000 (A); LCV = ₹6,750 (A); LRV = ₹4,950 (A); LEV = ₹1,800 (A).

37. JVG Ltd. produces a product and operates a standard costing system and value material and finished goods inventories at standard cost. The information related with the product is as follows:

[RTP Nov 2019]

Particulars	Cost per unit (₹)
Direct materials (30 kg at ₹350 per kg)	10,500
Direct labour (5 hours at ₹80 per hour)	400

The actual information for the month just ended is as follows:

(a) The budgeted and actual production for the month of September 2019 is 1,000 units.

(b) Direct materials – 5,000 kg at the beginning of the month. The closing balance of direct materials for the month was 10,000 kg. Purchases during the month were made at ₹365 per kg. The actual utilization of direct materials was 7,200 kg more than the budgeted quantity.

(c) Direct labour – 5,300 hours were utilized at a cost of ₹4,34,600

Required:

Calculate

(i) Direct material price and usage variances

(ii) Direct labour rate and efficiency variances.

Ans. (i) ₹5,58,000 (A); ₹25,20,000 (A); (ii) ₹10,600 (A); ₹24,000 (A).

38. The following data for SK ltd. is given: **[SM]**

	Budget	Actual
Production (in units)	400	360
Man hours to produce above	8,000	7,000
Variable overheads (in ₹)	10,000	9,150

The standard time to produce one unit of the product is 20 hours. Calculate relevant variable overhead variances.

Ans. ₹150 (A); ₹400 (A); ₹250 (F).

39. SK company has established the following standards for factory overheads. **[SM]**

Variable overhead per unit	₹10
Fixed overheads per month	₹1,00,000
Capacity of the plant 20,000 units per month.	

The actual data for the month are as follows:

Actual overheads incurred	₹3,00,000
Actual output (units)	15,000 units

Required to calculate:

(i) Production volume variance

(ii) Overhead expense variance.

Ans. (i) ₹25,000 (A); (ii) ₹50,000 (A).

39 .SK Ltd. has furnished the following data: **[SM]**

	Budget	Actual (for the month of July)
No. of working days	25	27
Production in units	20,000	22,000
Fixed overheads	₹30,000	₹31,000

Budgeted fixed overhead rate is ₹1.00 per hour. In July, the actual hours worked were 31,500.

Calculate the following variances:

(i) Volume variance

(ii) Expenditure variance

(iii) Total overhead variance

Ans. (i) ₹3,000 (F); (ii) ₹1,000 (A); (iii) ₹2,000 (F).

40. SK Ltd. has furnished you the following information for the month of August: **[SM]**

	Budget	Actual
Output (units)	30,000	32,500
Hours	30,000	33,000
Fixed Overhead	₹45,000	₹50,000
Variable Overhead	₹60,000	₹68,000
Working days	25	26

Calculate overhead variances.

41. Premier Industries has a small factory where 52 workers are employed on an average for 25 days a month and they work 8 hours per day. The normal down time is 15%. The firm has introduced standard costing for cost control. Its monthly budget for November, 2020 shows that the budgeted variable and fixed overhead are ₹1,06,080 and ₹2,21,000 respectively. **[Jan 2021]**

The firm reports the following details of actual performance for November, 2020 after the end of the month:

Actual hours worked	8,100 hrs.
Actual production expressed in standard hours	8,800 hrs.
Actual Variable Overheads	₹1,02,000
Actual Fixed Overheads	₹2,00,000

You are required to calculate:

(i) Variable Overhead Variances:

  (a) Variable overhead expenditure variance

  (b) Variable overhead efficiency variance

(ii) Fixed Overhead Variances:

  (a) Fixed overhead budget variance

  (b) Fixed overhead capacity variance

(c) Fixed overhead efficiency variance

(iii) Control Ratios:

(a) Capacity ratio

(b) Efficiency ratio

(c) Activity ratio

Ans. (i) (a) ₹4,800 (A); (b) ₹8,400 (F); (ii) (a) ₹21,000 (F); (b) ₹18,500 (A); (c) ₹17,500 (F); (iii) (a) 91,63%; (b) 108.64%; (c) 99.54%.

42. Following are the standard cost for a product-X: **[RTP Nov 2020]**

	(₹)
Direct materials 10 kg @ ₹90 per kg	900
Direct labour 8 hours @ ₹100 per hour	800
Variable Overhead 8 hours @ ₹15 per hour	120
Fixed Overhead	400
	2,220

Budgeted output for the year was 2,000 units. Actual output is 1,800 units.

Actual cost for year is as follows:

	(₹)
Direct materials 17,800 kg @ ₹92 per kg	16,37,600
Direct labour 14,000 hours @ ₹104 per hour	14,56,000
Variable overhead incurred	2,17,500
Fixed overhead incurred	7,68,000

You are required to Calculate:

(i) Material Usage Variance

(ii) Material Price Variance

(iii) Material Cost Variance

(iv) Labour Efficiency Variance

(v) Labour Rate Variance

(vi) Labour Cost Variance

(vii) Variable Overhead Cost Variance

(viii) Fixed Overhead Cost Variance

Ans. (i) ₹18,000 (F); (ii) ₹35,600 (A); (iii) ₹17,600 (A); (iv) ₹40,000 (F); (v) ₹56,000 (A); (vi) ₹16,000 (A); (vii) ₹1,500 (A); (viii) ₹48,000 (A).

43. Sara Ltd. has furnished the following standard cost data per' unit of production:

Material 15 kg @ ₹15 per kg.

Labour 6 hours @ ₹5 per hour

Variable overhead 6 hours @ ₹12 per hour.

Fixed overhead ₹4,50,000 per month (Based on a normal volume of

30,000 labour hours.)
The actual cost data for the month of August 2023 are as follows:
Material used 65,000 kg at a cost of ₹9,85,000.
Labour paid ₹1,40,000 for 31,500 hours worked.
Variable overheads ₹3,60,200
Fixed overheads ₹4,70,000
Actual production 4,800 units.
Calculate:
(i) Material Cost Variance.
(ii) Labour Cost Variance.
(iii) Fixed Overhead Cost Variance.
(iv) Variable Overhead Cost Variance

Ans. (i) ₹95,000 (F); (ii) ₹4,000 (F); (iii) ₹38,000 (A); (iv) ₹14,600 (A)

44. Ahaan Limited operates a system of standard costing in respect of one of its products 'AH1' which is manufactures within a single cost centre. Details of standard per unit are as follows:

[RTP Nov 2022]

- The standard material input is 20 kilograms at a standard price of ₹24 per kilogram.
- The standard wage rate is ₹72 per hour and 5 hours are allowed to produced one unit.
- Fixed production overhead is absorbed at the rate of 100% of wages cost.

During the month of April 2022, the following was incurred:

- Actual price paid for material purchased @ ₹22 per kilogram
- Total direct wages cost was ₹43,92,000
- Fixed production overhead cost incurred was ₹45,00,000

Analysis of variances was as follows:

Variances	Favorable	Adverse
Direct material price	₹4,80,000	-
Direct material usage	₹48,000	-
Direct labour rate	-	₹69,120
Direct labour efficiency	₹33,120	-
Fixed production overhead expenditure	-	₹1,80,000

You are required to calculate the following for the month of April, 2022:

(a) Material cost variance
(b) Budgeted output (in units)
(c) Quantity of raw materials purchased (in kilograms)
(d) Actual output (in units)
(e) Actual hours worked

(f) Actual wage rate per labour hour

(g) Labour cost variance

(h) Production overhead cost variance

Ans. (a) ₹5,28,000 (F); (b) 12,000 units; (c) 2,40,000 kg; (d) 12,100 units; (e) 60,040 hours; (f) ₹73.15 per hour; (g) ₹36,000 (A); (h) ₹1,44,000 (A).

45. The wages budget for the last period was based on a standard repair time of 30 minutes per unit and a standard wage rate of ₹ 50 per hour. The actual data for the last period are as follows:

Number of units = 30,000 **[MTP May 2024]**

Labour rate variance = 7,500 (A)

Labour efficiency variance = Nil

From the information find out the actual rate of wages per unit

(a) ₹ 50 (b) ₹ 25.50 (c) ₹ 50.50 (d) ₹ 25.25

Ans. (b) ₹ 25.50

SOLUTION OF PRACTICE QUESTIONS

26. Basic Calculation

Particulars	Standard (1 unit of Z)			Actual (1 unit of Z)		
	Quantity	Rate	Amount	Quantity	Rate	Amount
Material	50	1	50	45	0.80	36

Calculation of variances

(a) Material Cost Variance = SC – AC
= 50 – 36 = ₹14 (F)

(b) Material Price Variance = (SP – AP) × AQ
= (1 – 0.80) × 45 = ₹9 (F)

(c) Material Usage Variance = (SQ – AQ) × SP
= (50 – 45) × 1 = ₹5 (F)

27.

Basic Calculation

Particulars	Standard (10 units)			Actual (10 units)			Revised Std. Quantity
	Quantity	Rate	Amount	Quantity	Rate	Amount	
Material X	600	15	9,000	640	17.50	11,200	$2460 \times \frac{600}{2400} = 615$
Material Y	800	20	16,000	950	18.00	17,100	$2460 \times \frac{800}{2400} = 820$

Material Z	1,000	25	25,000	870	27.50	23,925	$2460 \times \frac{1,000}{2400} = 1,025$
Input	2,400		50,000	870		23,925	2460

Calculation of Variances

1. Material Cost Variance = Standard Cost – Actual cost

   X = 9,000 – 11,200 = ₹2,200 (A)

   Y = 16,000 – 17,100 = ₹1,100 (A)

   Z = 25,000 – 23,925 = ₹1,075 (F)

   MCV = ₹2,225 (A)

2. Material Price Variance = (SP – AP) × AQ

   X = (14 – 17.50) × 640 = ₹1,600 (A)

   Y = (20 – 18) × 950 = ₹1,900 (F)

   Z = (25 – 27.50) × 870 = ₹2,175 (A)

   MPV = ₹1,875 (A)

3. Material Usage (or Quantity) Variance = (SQ – AQ) × SP

   X = (600 – 640) × 15 = ₹600 (A)

   Y = (800 – 950) × 20 = ₹3,000 (A)

   Z = (1,000 – 870) × 25 = ₹3,250 (A)

   MUV = ₹ 350 (A)

4. Material Mix Variance = (RSQ - AQ) × SP
   - X = (615 – 640) × 15 = ₹375 (A)
   - Y = (820 – 950) × 20 = ₹2,600 (A)
   - Z = (1,025 – 870) × 25 = ₹3,875 (F)
   - MMV = ₹ 900 (F)
5. Material Yield Variance = (SQ - RSQ) × SP
   - X = (600 – 615) × 15 = ₹225 (A)
   - Y = (800 – 820) × 20 = ₹400 (A)
   - Z = (1,000 – 1,025) × 25 = ₹625 (A)
   - MYV = ₹1,250 (A)

28.

(i) Material cost variance = Standard cost – Actual cost

3,625 (F) = Standard cost – 59,825

3,625 = Standard cost – 59,825

Standard cost = 63,450

Total standard input required for actual output = $\frac{1,480}{90\%}$ = 1,645 kg

Standard quantity of material A = $\frac{800}{(800+600)} \times 1,645$ = 940 kg

Standard quantity of material B = $\frac{600}{(800+600)} \times 1,645$ = 705 kg

Standard cost of Material A + Standard cost of Material B = 63,450

$(SQ_A \times SP_A) + (SQ_B \times SP_B) = 63,450$

$(940 \times SP_A) + (705 \times 30) = 63,450$

$SP_A = \frac{42,300}{940}$

Standard price of material A = ₹45

(ii) Material price variance = (AQ × SP) – (AQ × AP)

175 (F) = (AQ × SP) – 59,825

175 = (AQ × SP) – 59,825

AQ × SP = 60,000

$(AQ_A \times SP_A) + (AQ_B \times SP_B) = 60,000$

$(900 \times 45) + (AQ_B \times 30) = 60,000$

$AQ_B = \frac{19,500}{30}$

Actual quantity of material B = 650 kg

(iii) Given, AQ × AP = 59,825

$(AQ_A \times AP_A) + (AQ_B \times AP_B) = 59,825$

$(900 \times AP_A) + (650 \times 32.50) = 59,825$

$AP_A = \frac{38,700}{900}$

Actual price of material A = ₹43

(iv) Total actual input quantity = 900 + 650 = 1,550 kg

Revised standard quantity of material A = $\frac{800}{(800+600)} \times 1,550$ = 886 kg

Revised standard quantity of material A = $\frac{600}{(800+600)} \times 1,550$ = 664 kg

(v) Material Mix Variance = (RSQ – AQ) × SP

Material A = (886 – 900) × 45 = ₹630 (A)

Material B = (664 – 650) × 30 = ₹420 (F)

₹210 (A)

29.

(a) MPV = (SR – AR) × AQ 51,000 = 10 × AQ AQ = 5,100 kg

Actual price = $\frac{7,14,000}{5,100}$ = ₹140

(b) MUV = (SQ – AQ) × SP = (5,000 – 5,100) × 150 = ₹15,000 (A)

(c) MCV = SC – AC = (5,000 × 150) – (5,100 × 140) = ₹7,50,000 – ₹7,14,000 = ₹36,000 (F)

30.

Particulars	Standard for 1 Job			Actual for 1 Job		
	Quantity	Rate	Amount	Quantity	Rate	Amount
Labour	1,000	50	50,000	900	$\frac{36,000}{900} = 40$	36,000

Calculation of Variances:

Labour Cost Variance = SC – AC = 50,000 – 36,000 = ₹14,000 (F)

Labour Rate Variance = (SR – AR) × AQ = (50 – 40) × 900 = ₹9,000 (F)

Labour Efficiency Variance = (SQ – AQ) × SR = (1,000 – 900) × 50 = ₹5,000 (F)

31.

Category	Standard			Actual				
	Hours	Rate	Amount	Hours	Rate	Amount	Idle Hours	Hours Worked
Skilled	$\frac{65\times40\times1800}{2000}$ = 2340	45	1,05,300	50 × 40 = 2000	50	1,00,000	50 × 2 = 100	1900
Semi-skilled	$\frac{20\times40\times1800}{2000}$ = 720	30	21,600	30 × 40 = 1200	35	42,000	30 × 2 = 60	1140
Unskilled	$\frac{15\times40\times1800}{2000}$ = 540	15	8,100	20 × 40 = 800	10	8,000	20 × 2 = 40	760
Total	3,600		1,35,000	4,000		1,50,000	200	3,800

(a) Labour Cost Variance = SC – AC

Skilled	= 1,05,300 – 1,00,000	= ₹5,300 (F)
Semi-Skilled	= 21,600 – 42,000	= ₹20,400 (A)
Unskilled	= 8,100 – 8,000	= ₹100 (F)
		= ₹15,000 (A)

(b) Labour Efficiency Variance = (SH – AH) × SR

Skilled	= (2340 – 2000) × 45	= ₹19,800 (F)
Semi-Skilled	= (720 – 1200) × 30	= ₹12,600 (A)
Unskilled	= (540 – 800) × 15	= ₹3,300 (A)
		= ₹3,900 (F)

(c) Labour Idle time Variance = Idle hours × SR

Skilled	= 100 × 45	= ₹4,500 (F)
Semi-skilled	= 60 × 30	= ₹1,800 (F)
Unskilled	= 40 × 15	= ₹600 (F)
		= ₹6,900 (F)

32.

Basic Calculation

Particulars	Standard (10,000 units)			Actual (10,000 units)			Revised Std. Qty.
	Quantity	Rate	Amount	Quantity	Rate	Amount	
Skilled	10,000 × 2 = 20,000	6	1,20,000	18,000	7	1,26,000	$\frac{20,000}{1,00,000}$ × 1,07,000 = 21,400
Semi-skilled	10,000 × 3 = 30,000	4	1,20,000	33,000	3.5	1,15,500	$\frac{30,000}{1,00,000}$ × 1,07,000 = 32,100
Unskilled	10,000 × 5 = 50,000	3	1,50,000	58,000	4	2,32,000	$\frac{50,000}{1,00,000}$ × 1,07,000 = 53,500
Total	1,00,000		3,90,000	1,09,000		4,73,500	1,07,000

Particulars	Hours Paid	Idle Hours	Hours Worked
Skilled	18,000	500	17,500
Semi-skilled	33,000	700	32,300
Unskilled	58,000	800	57,200
Total	1,09,000	2,000	1,07,000

Calculation of Variances

(a) Labour Cost Variance = Standard Cost – Actual cost
- Skilled = 1,20,000 – 1,26,000 = ₹6,000 (A)
- Semi-skilled = 1,20,000 – 1,15,500 = ₹4,500 (F)
- Unskilled = 1,50,000 – 2,32,000 = ₹82,000 (A)
- LCV = ₹83,500 (A)

(b) Labour Rate Variance = (SR – AR) × AH paid
- Skilled = (6 – 7) × 18,000 = ₹18,000 (F)
- Semi-skilled = (4 – 3.5) × 33,000 = ₹16,500 (F)
- Unskilled = (3 – 4) × 58,000 = ₹58,000 (A)

- LRV = ₹59,500 (A)

(c) Labour Efficiency Variance = (SH – AH worked) × SR
- Skilled = (20,000 – 17,500) × 6 = ₹15,000 (F)
- Semi-skilled = (30,000 – 32,300) × 4 = ₹9,200 (A)
- Unskilled = (50,000 – 57,200) × 3 = ₹21,600 (A)
- LEV = ₹15,800 (A)

(d) Idle Time Variance = Idle Hours × SR
- Skilled = 500 × 6 = ₹3,000 (A)
- Semi-skilled = 700 × 4 = ₹2,800 (A)
- Unskilled = 800 × 3 = ₹2,400 (A)
- Idle time variance = ₹8,200 (A)

(e) Labour Mix Variance = (RSH – AH worked) × SR
- Skilled = (21,400 – 17,500) × 6 = ₹23,400 (F)
- Semi-skilled = (32,100 – 32,300) × 4 = ₹800 (A)
- Unskilled = (53,500 – 57,200) × 3 = ₹11,100 (A)
- LMV = ₹11,500 (F)

(f) Labour Yield Variance = (SH - RSH) × SR
- Skilled = (20,000 – 21,400) × 6 = ₹8,400 (A)
- Semi-skilled = (30,000 – 32,300) × 4 = ₹8,400 (A)
- Unskilled = (50,000 – 57,200) × 3 = ₹10,500 (A)
- LYV = ₹27,300 (A)

(b) Revised LRV
- Skilled = [(6 – 5.5) × 5000]+ [(6 – 7) × 13000]= ₹10,500(A)
- Semi skilled = (4 – 3.5) × 33000 = ₹16,500(F)
- Unskilled = (3 – 4) × 58000 = 58,000(A) = 52,000(A)

33.

Basic Calculation

Particulars	Standard (1,600 units)			Actual (1,600 units)			Revised Std. Qty.
	Quantity	Rate	Amount	Quantity	Rate	Amount	
Skilled	$\frac{40\times30}{2,000}\times1600$ = 960	70	67,200	40×40 = 1,600	75	1,20,000	$\frac{960}{1,760}\times1980$ = 1,080
Semi-skilled	$\frac{40\times15}{2,000}\times1600$ = 480	65	31,200	40×10 = 400	60	24,000	$\frac{480}{1,760}\times1980$ = 540

Unskilled	$\frac{40\times10}{2,000}\times1600 = 320$	50	16,000	40×5 = 200	52	10,400	$\frac{320}{1,760}\times1980 = 360$
Total	1,760		1,14,400	2,200		1,54,400	1,980

Particulars	Hours Paid	Idle Hours	Hours Worked
Skilled	40 × 40 =1,600	40 × 4 = 160	1,600 – 160 = 1,440
Semi-skilled	40× 10 = 400	10 × 4 = 40	400 – 40 = 360
Unskilled	40× 5 = 200	5 × 4 = 20	200 – 20 = 180
Total	22,00	220	1,980

Calculation of Variances

(i) Labour Cost Variance = Standard Cost – Actual cost
- Skilled = 67,200 – 1,20,000 = ₹52,800 (A)
- Semi-skilled = 31,200 – 24,000 = ₹7,200 (F)
- Unskilled = 16,000 – 10,400 = ₹5,600 (F)
- LCV = ₹40,000 (A)

(ii) Labour Rate Variance = (SR – AR) × AH paid
- Skilled = (70 – 75) × 1,600 = ₹8,000 (A)
- Semi-Skilled = (65 – 60) × 400 = ₹2,000 (F)
- Unskilled = (50 – 52) × 200 = ₹400 (A)
- LRV = ₹6,400 (A)

(iii) Labour Efficiency Variance = (SH – AH worked) × SR
- Skilled = (960 – 1,440) × 70 = ₹33,600 (A)
- Semi-Skilled = (480 – 360) × 65 = ₹7,800 (F)
- Unskilled = (320 – 180) × 50 = ₹7,000 (F)
- LEV = ₹18,800 (A)

(iv) Labour Mix Variance = (RSH – AH worked) × SR
- Skilled = (1,080 – 1,440) × 70 = ₹25,200 (A)
- Semi-Skilled = (540 –360) × 65 = ₹11,700 (F)
- Unskilled = (360 – 180) × 50 = ₹9,000 (F)
- LMV = ₹4,500 (A)

(v) Idle Time Variance = Idle Hours × SR
- Skilled = 160 × 70 = ₹11,200 (A)
- Semi-Skilled = 40 × 65 = ₹2,600 (A)
- Unskilled = 20 × 50 = ₹1,000 (A)
- Idle time variance = ₹14,800 (A)

34. SR – Standard labour Rate per Hour

AR – Actual labour rate per hour

SH – Standard Hours

AH – Actual hours

(a) Labour rate Variance = AH (SR – AR)

17,094 (₹8 – AR) = – 68,376

₹8 – AR = – 4

Or, AR = ₹12

(b) Labour Efficiency = $\frac{SH}{AH} \times 100 = 105.3$

$SH = \frac{AH}{100} \times 105.3 = \frac{17,094}{100} \times 105.3 = 17,999.982$ or, SH = 18,000 hours

(c) Labour Efficiency Variance = SR (SH – AH)

= ₹8(18,000 – 17,094) = 8 × 906 = ₹7,248 (F)

(d) Standard Labour Cost per Unit = $\frac{18,000 \times 8}{6,000} = ₹24$

(e) Actual Labour Cost per Unit = $\frac{17,094 \times 12}{6,000} = ₹34.19$

35. **Basic Calculation**

Particulars	Standard (1,800 units)			Actual (1,800 units)		
	Quantity	Rate	Amount	Quantity	Rate	Amount
Material	10×1,800 = 18,000	4	72,000	19,000	$\frac{88,000}{20,000} =$ 4.40	83,600
Labour	2.5 × 1,800 = 4,500	4	18,000	4,950	$\frac{24,750}{4,950} = 5$	24,750

Material Cost Variance = SC – AC
= 72,000 – 83,600 = ₹11,600 (A)

Material Price Variance = (SP – AP) × AQ
= (4 – 4.40) × 19,000 = ₹7,600 (A)

Material Usage Variance = (SQ – AQ) × SR
= (18,000 – 19,000) × 4 = ₹4,000 (A)

Labour Cost Variance = SC – AC
= 18,000 – 24,750 = ₹6,750 (A)

Labour Rate Variance = (SR – AR) × AH paid

= (4 – 5) × 4,950 = ₹4,950 (A)

Labour efficiency variance = (SH – AH worked) × SR

= (4,500 – 4,950) × 4 = ₹1,800 (A)

36.

Working Note:

Quantity of material purchased and used:

Number of units produced	1,000 units
Standard input per unit	30 kg
Standard quantity (kg)	30,000 kg
Add: Excess usage	7,200 kg
Actual quantity usage	37,200 kg
Add: Closing stock	10,000 kg
Less: Opening stock	5,000 kg
Quantity of material purchased	42,200 kg

(i) Direct material price variance = (SP – AP) × Actual quantity used

= (350 – 365) × 37,200 = ₹5,58,000 (A)

This can be alternatively computed on the basis of actual quantity purchased.

Direct material usage variance = (SQ – AQ) × SP

= (30,000 – 37,200) × 350 = ₹25,20,000 (A)

(ii) Direct labour rate variance = (SR – AR) × Actual hours

= (80 – 82) × 5,300 = ₹10,600 (A)

Direct labour efficiency variance = (SH – AH) × SR

= [(1,000×5) – 5,300] × 80 = ₹24,000 (A)

37.

Particulars	Standard (360 units)			Actual (360 units)		
	Qty.	Rate ₹	Amount ₹	Qty.	Rate ₹	Amount ₹
Variable OHs	$\frac{8,000}{400}\times 360$ = 7,200	$\frac{10,050}{8,000}$ = 1.25	9,000	7,000	$\frac{9,150}{7,000}$ = 1.3071	9,150

Variable OH Cost Variance = Recovered OHs – Actual OHs

= 9,000 – 9,150 = ₹150 (A)

Variable OH Expenditure Variance = (RR – AR) × Actual hours

= (1.25 – 1.3071) × 7,000 = ₹400 (A)

Variable OH Efficiency Variance = (SH – AH) × RR

= (7,200 – 7,000) × 1.25 = ₹250 (F)

38. Fixed overhead volume variance = Recovered OHs – Actual OHs

= (15,000 units × ₹5) – (20,000 units × ₹5)

= 75,000 – 1,00,000

= ₹25,000 (A)

Fixed overhead expense variance = Budgeted OHs – Actual Fixed OHs

= (20,000 units × ₹5) – (Total OHs – Variable OHs)

= 1,00,000 – [3,00,000 – (15,000 units × ₹10)]

= 1,00,000 – 1,50,000

= ₹50,000 (A)

39. Basic Calculations:

	Budgeted Hours	Recovery Rate	Budgeted Overheads
	30,000÷1 = 30,000	1	30,000
Revised Budgeted Hours	**Actual Hours**		**Actual Overheads**
$\frac{30,000}{25}\times 27 = 32,400$	31,500		31,000
	Standard Hours	**Recovery Rate**	**Recovered Overheads**
	$\frac{30,000}{20,000}\times 22,000$ =33,000	1	33,000

Calculation of Variances

(i) Expenditure Variance = Budgeted overhead – Actual overhead
= 30,000 – 31,000 = ₹1,000 (A)

(ii) Volume Variance = Recovered overhead – Budgeted overhead
= 33,000 – 30,000 = ₹3,000 (F)

(iii) F. O. Cost Variance = Recovered overhead – Actual overhead
= 33,000 – 31,000 = ₹2,000 (F)

40. Basic Calculations

Particulars	Standard (32,500 units)			Actual (32,500 units)		
	Hrs.	Rate ₹	Amount ₹	Hrs.	Rate ₹	Amount ₹
Variable Expenses	$\frac{30,000}{30,000}\times 32,500$ = 32,500	$\frac{60,000}{30,000} = 2$	65,000	33,000	$\frac{68,000}{33,000}$ = 2.0606	68,000

	Budgeted Hours	Recovery Rate	Budgeted Overheads
	30,000	45,000 × 30,000 = 1.50	45,000
Revised Bud. hours	**Actual Hours**		**Actual Overheads**

$\frac{30,000}{25}\times 26$ = 31,200	33,000		50,000
	Standard Hours	**Recovery Rate**	**Recovered Overheads**
	$\frac{30,000}{30,000}\times 32,500$ = 32,500	1.50	48,750

Variable Overhead Variance

(i) Variable Overhead Budget Variable (A) = (SR – AR) × AH = (2 – 2.0606) × 33,000 = ₹2,000

(ii) Variable Overhead Efficiency Variable (A) = (SH – AH) × SR = (32,500 – 33,000) × 2 = ₹1,000

(iii) Variable Overhead Cost Variable = Absorbed OHs – Actual OHs = 65,000 – 68,000 = ₹3,000 (A)

Fixed Overhead Variances

(i) Fixed Overhead Budget Variance = Budgeted overhead – Actual overhead
= 45,000 – 50,000 = ₹5,000 (A)

(ii) Fixed Overhead Volume Variance = Absorbed OHs – Budgeted OHs
= 48,750 – 45,000 = ₹3,750 (F)

(iii) Fixed Overhead Cost Variance = Absorbed OHs – Actual OHs
= 48,750 – 50,000 = ₹1,250 (A)

(iv) Fixed Overhead Capacity Variance = (AH – RBH) × RR
= (33,000 – 31,200) × 1.50 = ₹2,700 (F)

(v) Fixed Overhead Calendar Variance = (RBH – BH) × RR
= (31,200 – 30,000) × 1.50 = ₹1,800

41. Basic Calculations

Particulars	Standard			Actual		
	Hrs.	Rate ₹	Amount ₹	Hrs.	Rate ₹	Amount ₹
Variable Expenses	8,800	$\frac{1,06,080}{8,840}$ = 12	1,05,600	8,100	$\frac{1,02,000}{8,100}$ = 12.5926	1,02,000

Budgeted Hours	Recovery Rate	Budgeted Overheads
8,840	25	2,21,000
Actual Hours		**Actual Overheads**

8,100		2,00,000
Standard Hours	**Recovery Rate**	**Recovered Overheads**
8,800	25	2,20,000

(i) (a) Variable overhead expenditure variance = (SR – AR) × Actual Hrs.
= (12 – 12.5926) × 8,100 = ₹4,800 (A)

(b) Variable overhead efficiency variance = (SH – AH) × Std. Rate
= (8,800 – 8,100) × 12 = ₹8,400 (F)

(ii) (a) Fixed overhead budget variance = Budgeted OH – Actual OH
= 2,21,000 – 2,00,000 = ₹21,000 (F)

(b) Fixed overhead capacity variance = (AH – BH) × Recovery rate
= (8,100 – 8,840) × 25 = ₹18,500 (A)

(c) Fixed overhead efficiency variance = (SH – AH) × Recovery rate
= (8,800 – 8,100) × 25 = ₹17,500 (F)

(iii) (a) Capacity ratio $= \frac{\text{Actual Hours}}{\text{Budgeted Hours}} \times 100 = \frac{8,100}{8,840} \times 100 = 91.63\%$

(b) Efficiency ratio $= \frac{\text{Standard Hours}}{\text{Actual Hours}} \times 100 = \frac{8,800}{8,100} \times 100 = 108.64\%$

(c) Activity ratio $= \frac{\text{Standard Hours}}{\text{Budgeted Hours}} \times 100 = \frac{8,800}{8,840} \times 100 = 99.54\%$

42.

(i) Material usage variance = (Std. quantity – Actual quantity) × Std. price
= (18,000 – 17,800) × 90 = ₹18,000 (F)

(ii) Material price variance = (Std. price – Actual price) × Actual qty.
= (90 – 92) × 17,800 = ₹35,600 (A)

(iii) Material cost variance = Std. cost – Actual cost
= (18,000 × 90) – 16,37,600 = ₹17,600 (A)

(iv) Labour Efficiency variance = (Std. hours – Actual hours) × Std. rate
= [(1,800 × 8) – 14,000] × 100 = ₹40,000 (F)

(v) Labour Rate variance = (Std. rate – Actual rate) × Actual hours
= (100 – 104) × 14,000 = ₹56,000 (A)

(vi) Labour cost variance = Std. cost – Actual cost
= (1,800 × 8 × 100) – 14,56,000 = ₹16,000 (A)

(vii) Variable cost variance = Std. variable cost – Actual variable cost
= (1,800 × 8 × 15) – 2,17,500 = ₹1,500 (A)

(viii) Fixed OHs cost variance = Recovered overheads – Actual overheads
= (1,800 × 400) – 7,68,000 = ₹48,000 (A)

43. Working Note

(a) Budgeted fixed overhead rate = 4,50,000 ÷ 30,000 = ₹15 per hour

(i) Material cost variance = Standard cost – Actual cost
= (4,800 × 15kg × ₹15) – 9,85,000 = ₹95,000 (F)

(ii) Labour cost variance = Standard cost – Actual cost
= (4,800 × 6 hours × ₹5) – 1,40,000 = ₹4,000 (F)

(iii) Fixed OH cost variance = Recovered Overheads – Actual Overheads
= (4,800 × 6 hours × ₹15) – 4,70,000 = ₹38,000 (A)

(iv) Variable OH cost variance = Recovered Overheads – Actual Overheads
= (4,800 × 6 hours × ₹12) – 3,60,200 = ₹14,600 (A)

44. (a) Direct material cost variance = Material price variance + Material usage variance
= 4,80,000 + 48,000 = ₹5,28,000 (F)

(b) Fixed OH expenditure variance = Budgeted OHs – Actual OHs
1,80,000 (A) = [Budgeted output × (5 hrs. × ₹72)] – 45,00,000
– 1,80,000 = (Budgeted output × 360) – 45,00,000

$$\text{Budgeted output} = \frac{45,00,000 - 1,80,000}{360} = 12,000 \text{ units}$$

(c) Material price variance = (SP – AP) × Actual quantity
4,80,000 (F) = (24 – 22) × Actual quantity
Actual quantity = 2,40,000 kg

(d) Labour cost variance = Standard labour cost – Actual labour cost
LRV + LEV = Standard labour cost – 43,92,000
69,120 (A) + 33,120 (F) = Standard labour cost – 43,92,000
Standard labour cost = 43,92,000 – 69,120 + 33,120 = ₹43,56,000

$$\text{Actual output} = \frac{\text{Standard labour cost}}{\text{Standard wage rate per unit}} = \frac{43,56,000}{(72 \times 5)} = 12,100 \text{ units}$$

(e) Labour efficiency variance = (SH – AH) × SR
33,120 (F) = [(12,100 × 5) – AH] × 72
460 = 60,500 – Actual hours
Actual hours = 60,500 – 460 = 60,040 hours

(f) $\text{Actual wage rate per hour} = \frac{\text{Actual wages}}{\text{Actual hours}} = \frac{43,92,000}{60,040} = ₹73.15 \text{ per hour}$

(g) Labour cost variance = LEV + LRV = 33,120 (F) + 69,120 (A) = ₹36,000 (A)

(h) Production OH cost variance = Recovered OHs – Actual OHs
= (12,100 units × ₹360) – 45,00,000
= 1,44,000 (A)

45. Labour rate variance = (SR – AR) × Actual hours paid
7,500 (A) = (50 – AR) × (30,000 30/60)
–7,500 =(50 – AR) × 15,000
AR = (7,500 ÷ 15,000) + 50 = ₹50.50
Actual wage per unit = 50.50 × 30/60 = ₹25.25

❑❑❑

14 CHAPTER

Marginal Costing

Marginal Cost	• It is the amount at any given volume of output by which aggregate costs are changed if the volume of output is increased or decreased by one unit. • In other words, it is the incremental cost of production for producing one additional unit of product. • In other words, with the increase in one unit of output the total cost is increased and this increase in total cost due to change in the volume of output is known as marginal cost.
Marginal Costing	• It is the ascertainment of marginal costs and of the effect on profit of changes in volume or type of output, by differentiating between the fixed costs and variable cost. • Marginal costing is a technique which presents management with required information enabling it to measure the profitability of an undertaking by considering the behavior of costs. • It is a costing system where products or services and inventories are valued at variable cost only.
Characteristics of Marginal Costing	• All elements are classified into fixed and variable components. • The variable costs are treated as the cost of product. • Value of finished goods and work-in-progress is valued at marginal cost basis only. • Fixed cost are treated as period costs. • Profitability is determined with reference to their contribution margin.
Advantages of Marginal Costing	• **Help in managerial decisions –** The most important advantage of variable costing is the assistance that it renders to management in taking many valuable decisions. • **Cost Control –** Greater control over cost is possible. This is so because by classifying costs in fixed and variable, the management can concentrate more on the control of variable cost which are generally controllable and pay less attention to fixed costs which may be controlled only by the top management and that too, to a limited extent. • **Constant cost per unit –** Marginal costing takes into account only variable costs which remain the same per unit of product irrespective of the volume of output. It therefore avoids the effect of varying cost per unit as it ignores fixed costs which are incurred on a time basis and have no relation with the size of production.

	• **No under and over-absorption of overheads –** In marginal costing, there is no problem of under-or-over absorption of overheads. • **Aid to profit planning –** To aid profit planning marginal costing technique enables data to be presented to management is such a way as to show cost-volume-profit relationship. • **Simple technique –** Variable costing is comparatively simple to operate because it avoids the complications involved in allocation, apportionment and absorption of fixed overheads which is, in fact, arbitrary division of indivisible fixed costs. • **Realistic valuation of stocks –** In marginal costing, stocks of work-in-progress and finished goods are valued only at variable costs. Thus, no fictitious profits can arise due to fixed cost being absorbed and capitalized in unsold stock. Stock valuation in marginal costing, is, therefore more realistic and uniform. • **Valuable addition to other technique –** Marginal costing is a valuable addition to standard costing and budgetary control.
Limitations of Marginal Costing	• **Difficulty in classifying fixed and variable elements -** It is difficult to classify exactly the expenses into fixed and variable category. Most of the expenses are neither totally variable nor wholly fixed. For example, various amenities provided to workers may have no relation either to volume of production or time factor. • **Dependence of key factors -** Contribution of a product itself is not a guide for optimum profitability unless it is linked with the key factor. • **Ignores time factor and investment -** Marginal costing ignores time factor and investment. For example, the marginal cost of two jobs may be the same but the time taken for their completion and the cost of machines used may differ. The true cost of a job which takes longer time and uses costlier machine would be higher. This fact is not disclosed by marginal costing. • **Unpredictable nature of cost -** Some of the assumptions regarding the behavior of a various costs are not necessarily true in a realistic situation. For example, the assumption that fixed cost will remain static throughout is not correct. Fixed cost may change from one period to another. For example, salary bill may go up because of annual increments or due to change in pay rate etc. • **Faulty valuations -** Overheads of fixed nature cannot altogether be excluded particularly in large contracts, while valuing the work-in-progress. In order to show the correct position, fixed overheads have to be included in work-in-progress. • **Scope for low profitability -** Sales staff may mistake marginal cost for total cost and sell at a price; which will result in loss or low profits. Hence, sales staff should be cautioned while giving marginal cost.
Absorption Costing	• It is an approach to product costing in which all manufacturing costs, variable costs and fixed costs are charged to the cost of goods manufactured and inventories. • In absorption costing all manufacturing costs—variable and fixed—are charged to products, material and labour costs by direct measurement while indirect manufacturing costs by some methods of apportionment.

Difference between Absorption and Marginal Costing

Basis	Absorption Costing	Marginal Costing
1. Calculation of manufacturing overhead rates	Absorption rate includes, both fixed and variable manufacturing overheads.	Marginal costing rate includes only variable manufacturing overhead.
2. Valuation of inventory	Valuation is on Product cost i.e. Prime cost + applied fixed and variable manufacturing overhead.	Valuation will be at Prime cost + applied variable manufacturing overhead.
3. Classification of Overhead	Overheads may be classified as factory, administrative, selling and distribution	Overheads are classified as variable and fixed.
4. Operating profit	Gross Profit = Net sales – Prime cost - fixed and variable manufacturing overheads	Contribution = Net sales – variable manufacturing cost of goods sold – variable administrative selling and distribution overhead
5. Net operating profit	Net operating profit = Gross profit – administrative selling and distribution overheads (fixed and variable)	Net operating profit = Contribution - fixed manufacturing overhead – fixed administrative overhead – fixed selling and distribution overhead
6. Effect of stock valuation	The difference in the magnitude of opening and closing stock affect the unit cost of production.	The difference in the magnitude of opening and closing stock doesn't affect the unit cost of production.
7. Decision Making	It distorts decision making	It aids decision making

Difference in Profit under Marginal and Absorption Costing

- **No Opening or closing stock –** Both profit/loss will be equal.
- **When opening stock is equal to closing stock –** Both profit/loss will be equal provided fixed cost in both stock is same.
- **When closing stock is more than opening stock –** Profit as per absorption will be more than marginal.
- **When opening stock is more than closing stock –** Profit in marginal will be more than absorption.

Cost-Volume-Profit (CVP) Analysis

- It studies the variations in cost and profit in relation to change in the volume of output and sales though a large number of internal and external factors influence e.g. the amount of profit, the volume of output etc.
- The three factors of CVP analysis are interlinked and interdependent.

Importance and uses of CVP Analysis **[TRICK – Profit Decision depend on Cost Budget]**	• **Profit Planning -** In profit planning it becomes essential to know the relationship between cost, volume and profit. The most important feature of C-V-P analysis is the manner in which it relates cost, selling price and volume and enable calculation to be made to show the effect of change in these on profit. Accordingly, the management can plan profit with reference to C-V-P analysis. • **Decision Making -** C-V-P analysis is very useful in taking managerial decisions like make or buy, pricing, selection of a product mix, selection of best method of production, etc. • **Cost Control -** In the field of cost control C-V-P analysis is of great assistance to the management. The effect of cost of change in the volume can be evaluated for the purpose of reviewing profits earned and cost incurred. • **Preparation of Flexible Budget** - C-V-P analysis is of special help in the preparation of fixed budget which indicates cost and profit at different levels of activity.
Assumption underlying CVP Analysis	• All costs can be divided into fixed and variable category. • This analysis relates to the given capacity *i.e.,* it is basically a short- term analysis. • It assumes that variable cost fluctuates with volume proportionally. • This analysis presumes that fixed cost remains constant over a given volume. • Selling price per unit remains constant. • Costs and revenues are influenced only by the volume of output and sales. • Production technology and level of efficiency remains constant. • This analysis relates to a single product-mix which remains constant. • This analysis also presumes that prices of input factors will remain constant. • All stocks, both opening and closing are valued at variable cost.
Methods for Segregation of Semi-variable overheads	• **Levels of output compared to levels of expenses method –** The output at two different levels is compared with corresponding level of expenses. Since the fixed expenses remain constant, the variable overheads are arrived at by the ratio of change in expenses to change in output. $$\text{Variable element} = \frac{\text{Change in amount of expenses}}{\text{Saving in activity or output}}$$ • **Range method –** This method is similar to the previous method except that only the highest and lowest points are considered out of various levels. This method is also designated as 'high and low' method. • **Degree of variability method –** In this method, degree of variability is noted for each item of semi-variable expenses. Some semi-variable items may have 30% variability while others may have 70% variability. The method is easy to apply but difficult is faced in determining the degree of variability.

Contribution	• The difference between selling price and variable cost (i.e. the marginal cost) is known as 'Contribution' or 'Gross Margin'. • The idea is that after deducting the variable costs from sales, the figure remaining is the amount that contributes to fixed costs, and once fixed costs are covered, then to profits. Contribution = Selling price – Variable cost = Fixed cost + Profit
Profit/Volume Ratio (P/V Ratio)	• Profit-volume ratio establishes a relationship between the contribution and the sales value. • It is an indicator of the rate at which profit is being earned. • This ratio can also be called as 'Contribution/Sales' ratio. • This ratio can also be known by comparing the change in contribution to change in sales or change in profit to change in sales. • This ratio would remain constant at different levels of production. $\text{P/V Ratio} = \frac{\text{Contribution}}{\text{Sales}} = \frac{\text{Sales} - \text{Variable Costs}}{\text{Sales}}$ $= \frac{\text{Change in contribution}}{\text{Change in Sales}} = \frac{\text{Change in profit}}{\text{Change in Sales}}$
Improvement in P/V Ratio	• It can be improved by widening the gap between sales and variable cost. This can be achieved by: ➢ Increasing the selling price ➢ Reducing the variable cost ➢ Changing the sales mix, i.e., selling more of those products which have larger P/V ratio, thereby improving the overall P/V ratio
Break-even Analysis	• In its narrow sense it is concerned with finding out the break- even point. • Break-even-point is the point at which total revenue is equal to total cost. • In other words, it is the point of no profit or no loss. • In other words, it is the level at which contribution is just able to recover the fixed cost. • In its broad sense, break-even analysis refers to a system of analysis that can be used to determine the probable profit/loss at any level of production. $\text{Break-even Point}(\text{units}) = \frac{\text{Fixed Cost}}{\text{Contribution per unit}}$ $\text{Break-even Point}(\text{in sales value}) = \frac{\text{Fixed Cost}}{\text{P/V Ratio}}$
Assumptions underlying Break-even-analysis	• Fixed Costs remain unchanged at all levels of activity. • Variable cost change in direct proportion to the volume of output. • Costs can be classified into fixed and variable elements. • Selling price remains constant irrespective of volume or production or sales changes. • Price of raw materials, labour rate etc., remain constant.

Cash Break-even Point	• It is the level of output or sales where there will be "no cash profit and no cash loss". • In other words it is that activity level where the cash inflows will be just equal to cash required to meet immediate cash liabilities. • At this point, cash contribution equals the cash fixed cost, i.e. fixed cost excluding depreciation and deferred expenses. • For this purpose, the fixed costs are divided into two categories: (i) Fixed Costs which do not require immediate cash outlay *e.g.* depreciation, deferred expenses, and (ii) Fixed Costs which require immediate cash outlay, *e.g.* rent, salaries, etc. $\text{Cash Break-even Point}(\text{units}) = \frac{\text{Cash Fixed Cost}}{\text{Cash Contribution per unit}}$ $\text{Cash Break-even Point}(\text{in value}) = \frac{\text{Cash Fixed Cost}}{\text{P/V Ratio}}$
Angle of Incidence	• This is the angle formed at the break-even point at which the sales line cuts the total cost line. • This angle of incidence indicates that profits are being made. • Large angle of incidence is an indication that profits are being made of rupee at higher rate. • A small angle of incidence shows a low rate of profit and suggests that variable cost forms the major part of cost of production. • A large angle of incidence with a high margin of safety indicates the most favorite position of a business and even the existence of monopoly conditions.
Margin of Safety (M/S)	• It may be defined as the difference between actual sales and sales at break-even point. • Margin of safety may be expressed in absolute money terms or as a percentage of sales. • The size of the margin of safety indicates soundness of a business. • When margin of safety is large it means the business can still make profits after a serious fall in sales. • When margin of safety is low, any loss of sales may be a matter of serious concern. $\text{Margin of Safety}(\text{in ₹}) = \text{Actual sales} - \text{Break even Sales}$ $\text{Margin of Safety}(\text{in units}) = \text{Actual sales} - \text{Break even Sales}$ $\text{Margin of Safety}(\text{in ₹}) = \frac{\text{Profit}}{\text{P/V Ratio}}$ $\text{Margin of Safety}(\text{in units}) = \frac{\text{Profit}}{\text{Contribution per unit}}$

Application of CVP Analysis in Decision Making	• Identification of problem • Identification of options • Evaluation of the options • Selection of the option
Relevant Cost	• A cost is treated as relevant only if it is a future cost and it differs under two options under consideration.
Example of Relevant and Irrelevant Cost	• **Historical cost – Irrelevant** e.g. book value of machinery • **Sunk cost – Irrelevant** e.g. cost of drawing, blueprint • **Committed cost – Irrelevant** e.g. salary cost to employees • **Opportunity cost – Relevant** • **Notional or imputed cost – Relevant** e.g. notional interest • **Shut down cost – Relevant**
Key Factor	• The factor which may limit the activity level of a firm is known as the 'key factor'. • In most of the cases 'sales' is the key factor. Some other factor such as labour; machine capacity, material, etc. may not be available in requisite quantity will be a key factor as well. • Key factor governs the decision "how much to produce". • The 'maximizing contribution per unit of the limiting factor' rule can be of value, but can only be used where there is a single binding constraint and where the constraint is continuously divisible i.e. it can be altered one unit at a time.

PRACTICAL QUESTIONS

1. By noting "PV will increase or PV will decrease or PV will not change", as the case may be, state how the following independent situations will affect the PV ratio: **[SM]**

(i) An increase in the physical sales volume
(ii) An increase in the fixed cost
(iii) An increase in the variable cost per unit
(iv) A decrease in the contribution margin
(v) An increase in selling price per unit
(vi) A decrease in the fixed cost
(vii) A 10% increase in both selling price and variable cost per unit
(viii) A 10% increase in the selling price per unit and 10% decrease in the physical sales volume.
(ix) A 50% increase in the variable cost per unit and 50% decrease in the fixed cost
(x) An increase in the angle of incidence

2. A factory manufacturing sewing machines has the capacity to produce 500 machines per annum. The marginal (variable) cost of each machine is ₹200 and each machine is sold for ₹250. Fixed overheads are ₹12,000 per annum. Calculate the break-even points for output and sales and show what profit will result if output is 90% of capacity?

Ans. 240 machines; ₹60,000; Profit = ₹10,500.

3. From the following data, calculate

(a) P/V Ratio

(b) Profit when sales are ₹20,000 and

(c) New Break-even point if selling price is reduced by 20%.

Fixed expenses	₹4,000
Break-even point	₹10,000

Ans. (a) 40%; (b) ₹4,000; (c) ₹16,000.

4. Given the following information:

Fixed cost	=	₹4,000
Break even sales	=	₹20,000
Profit	=	₹1,000
Selling price per unit	=	₹20

You are required to calculate:

(a) Sales and marginal cost of sales, and

(b) New break-even point if selling price is reduced by 10%

Ans. (a) ₹25,000; ₹20,000; (b) ₹36,000.

5. The ratio of variable cost to sales is 70%. The break-even point occurs at 60% of the capacity sales. Find the capacity sales when fixed costs are ₹90,000. Also compute profit at 75% of the capacity sales. **[SM]**

Ans. Sales = ₹5,00,000; Profit = ₹22,500.

6. SK Ltd. sold 2,75,000 units of its product at ₹37.50 per unit. Variable costs are ₹17.50 per unit(manufacturing costs of ₹14 and selling cost ₹3.50 per unit). Fixed costs are incurred uniformly throughout the year and amounting to ₹35,00,000 (including depreciation of ₹15,00,000). There is no beginning or ending inventories. **[SM]**

Required to compute breakeven sales level quantity and cash breakeven sales level quantity.

Ans. 1,75,000 units; 1,00,000 units.

7. Following information are available for the year 2013 and 2014 of SK Limited:

Year	2013	2014
Sales	₹32,00,000	₹57,00,000
Profit/(Loss)	(₹3,00,000)	₹7,00,000

Calculate – (a) PV ratio, (b) total fixed cost, and (c) Sales required to earn a profit of ₹12,00,000.

Ans. (a) 40%; (b) ₹15,80,000; (c) ₹69,50,000.

8. SK Ltd. sells its product at ₹15 per unit. During the quarter ending on 31st March, it produced and sold 8,000 units and suffered a loss of ₹5 per unit. If the volume of sales is raised to 20,000 units, it can earn a profit of ₹4 per unit. **[SM, Similar May 2022]**

You are required to calculate:

(a) Break-even point in rupees

(b) Profit if the sale volume is 25,000 units

(c) Minimum level of production where the company needs not to close the production if unavoidable fixed costs is ₹75,000.

Ans. (a) ₹1,80,000; (b) ₹1,30,000; (c) 4,500 units.

9. SK Ltd. maintains margin of safety of 37.5% with an overall contribution to sales ratio of 40%. Its fixed costs amount to ₹5,00,000. Calculate the following: **[SM]**

(a) Break-even sales

(b) Total sales

(c) Total variable cost

(d) Current profit

(e) New 'margin of safety' if the sales volume is increased by 7.5%.

Ans. (a) ₹12,50,000; (b) ₹20,00,000; (c) ₹12,00,000; (d) ₹3,00,000; (e) 41.86%.

10. SK Ltd. reports the following cost structure at two capacity levels:

	2,000 units	1,500 units
	(100% capacity)	
Production overhead I	₹3 per unit	₹4 per unit
Production overhead II	₹2 per unit	₹2 per unit

If the selling price, reduced by direct material and labour is ₹8 per unit, what would be its break-even point?

Ans. 1,000 units.

11. SK Ltd. has furnished the following data for the two years:

	2017	2018
Sales	₹8,00,000	?
Profit/volume ratio (P/V Ratio)	50%	37.5%
Margin of safety sales as % of total sales	40%	21.875%

There has been substantial savings in the fixed cost in the year 2018 due to the restructuring process. The company could maintain its sales quantity level of 2017 in 2018 by reducing the selling price. You are required to calculate the following:

(a) Sales for 2018 in ₹

(b) Break-even sales for 2018 in ₹

(c) Fixed cost for 2018

Ans. (a) ₹6,40,000; (b) ₹5,00,000; (c) ₹1,87,500.

12. The following figures are related to SK Limited for the year ending 31st March:

Sales - 24,000 units @ ₹200 per unit;

P/V Ratio 25% and Break-even Point 50% of sales.

You are required to calculate:

(a) Fixed cost for the year

(b) Profit earned for the year

(c) Units to be sold to earn a target net profit of ₹11,00,000 for a year.

(d) Number of units to be sold to earn a net income of 25% on cost

(e) Selling price per unit if Break-even Point is to be brought down by 4,000 units.

Ans. (a) ₹6,00,000; (b) ₹6,00,000; (c) 34,000 units; (d) 60,000 units; (e) ₹225.

13. A Ltd. manufacture and sales its product R-9. The following figures have been collected from cost records of last year for the product R-9: **[RTP May - 2024]**

Elements of Cost	Variable Cost Portion	Fixed Cost
Direct Material	30% of Cost of Goods Sold	-
Direct Labour	15% of Cost of Goods Sold	-
Factory Overheads	10% of Cost of Goods Sold	₹2,30,000
General & Administration Overheads	2% of Cost of Goods Sold	₹71,000
Selling & Distribution Overhead	4% of Cost of Sales	₹68,000

Last Year 5,000 units were sold at ₹185 per unit. From the given data find the followings:

(a) Break-even Sales (in rupees)

(b) Profit earned during last year

(c) Margin of safety (in %)

(d) Profit if the sales were 10% less than the actual sales.
(Assume that administration overheads are related with production activity)

Ans. (a) ₹6,90,882; (b) ₹1,25,000; (c) 25.31%; (d) ₹75,600.

14. SK Ltd. manufactures a product "SK". In the month of March, 14,000 units of the product "SK" were sold, the details are as under:

	(₹)
Sale Revenue	2,52,000
Direct Material	1,12,000
Direct Labour	49,000
Variable Overheads	35,000
Fixed Overheads	28,000

A forecast for the month of April, has been carried out by the General manger of SK Ltd. As per the forecast, price of direct material and variable overhead will be increased by 10% and 5% respectively.

Required to calculate:

(a) Number of units to be sold to maintain the same quantum of profit that made in March.

(b) Margin of safety in the month of March and April.

Ans. (a) 18,212 units; (b) ₹1,26,000; ₹1,63,902.44.

15. SK Ltd. is operating at 80 % capacity and presents the following information:

Break-even Sales	₹400 crores
P/V Ratio	30 %
Margin of Safety	₹120 crores

SK's management has decided to increase production to 95 % capacity level with the following modifications:

(a) The selling price will be reduced by 10%.

(b) The variable cost will be increased by 2% on sales

(c) The fixed costs will increase by ₹50 crores, including depreciation on additions, but excluding interest on additional capital.

Additional capital of ₹100 crores will be needed for capital expenditure and working capital.

Required:

(i) Indicate the sales figure, with the working, that will be needed to earn ₹20 crores over and above the present profit and also meet 15% interest on the additional capital.

(ii) What will be the revised

(a) Break-even Sales

(b) P/V Ratio

(c) Margin of Safety

Ans. (i) ₹860.71 crores; (ii) (a) ₹660.71 crores; (b) 28%; (c) ₹200 crores.

16. SK Ltd. a chocolate and soft drink company is planning to establish a subsidiary company in India to produce mineral water. Based on the estimated annual sales of 40,000 bottles of the mineral water, cost studies produced the following estimates for the India subsidiary: **[SM]**

	Total Annual Costs (₹)	Per cent of Total Annual cost that is variable
Material	1,93,600	100%
Labour	90,000	70%
Overhead	80,000	64%
Administration	30,000	30%

The Indian production will be sold by manufacturer's representatives who will receive a commission of 8 per cent of the sale price. No portion of the British Office expenses is to be allocated to the Indian subsidiary. It is required to:

(a) Compute the sale price per bottle to enable management to realize an estimated 10 per cent profit on sale proceeds in India, and;

(b) Calculate the break-even point in rupee sales for the Indian subsidiary on the assumption that the sale price is ₹11 per bottle.

Ans. (a) ₹12; (b) ₹3,84,000.

17. SK Ltd. manufactures only pencils where the marginal cost of each pencil is ₹3. It has fixed costs of ₹25,000 per annum. Present production and sales of pencils is 50,000 units and selling price per pencil is ₹5. Any sale beyond 50,000 pencils is possible only if the company reduces 20% of its current selling price.

However, the reduced price applies only to the additional units. The company wants a target profit of ₹1,00,000. How many pencils must be produced and sold if the target is to be achieved?

Ans. 75,000 pencils.

18. A dairy product company manufacturing baby food with a shelf life of one year furnishes the following information: **[RTP Nov.-2023]**

(i) On 1st January, 2019, the company has an opening stock of 20,000 packets whose variable cost is ₹180 per packet.

(ii) In 2018, production was 1,20,000 packets and the expected production in 2019 is 1,50,000 packets. Expected sales for 2019 is 1,60,000 packets.

(iii) In 2018, fixed cost per unit was ₹60 and it is expected to increase by 10% in 2019. The variable cost is expected to increase by 25%. Selling price for 2019 has been fixed at ₹300 per packet.

You are required to calculate the Break-even volume in units for 2019.

Ans. 93,600 units.

19. A company has a P/V ratio of 40%. Compute by what percentage must sales be increased to offset: 20% reduction in selling price? Also find the required change in sales quantity level. **[SM]**

Ans. 200 units.

20. (a) You are given the following data for the coming year for a factory: **[SM]**

Budgeted output	8,00,000 units
Fixed expenses	₹40,00,000
Variable expenses per unit	₹100
Selling price per unit	₹200

Draw a break-even chart showing the break-even point.

(b) If price is reduced to ₹180, what will be the new break-even point?

Ans. (a) 40,000 units; (b) 50,000 units.

21. A company sells two products, S and K. The sales mix is 4 units of S and 3 units of K. The contribution margins per unit are ₹40 for S and ₹20 for K. Fixed costs are ₹6,16,000 per month. Compute the break-even point.

Ans. 11,200 units; 8,400 units.

22. CT Ltd. manufactures and sells a single product X whose selling price is ₹100 per unit and the variable cost is ₹60 per unit. **[SM]**

(a) If the Fixed Costs for this year are ₹24,00,000 and the annual sales are at 60% margin of safety, Calculate the rate of return on sales, assuming an income tax level of 40%.

(b) For the next year, it is proposed to add another product line Y whose selling price would be ₹150 per unit and the variable cost ₹100 per unit. The total fixed costs are estimated at ₹28,00,000. The sales mix of X : Y would be 5 : 3. Compute the breakeven sales in units for both the products.

Ans. (a) 14.40%; (b) 40,000 units; 24,000 units.

23. Prepare a profit graph for products S, K and M and find break-even point from the following data:

Particulars	S	K	M	Total
Sales (₹)	7,500	7,500	3,750	18,750
Variable cost (₹)	1,500	5,250	4,500	11,250
Fixed cost (₹)	-	-	-	5,000

24. A, B and C are three similar plants under the same management who want them to be merged for better operation. The details are as under:

Plant	A	B	C
Capacity operated	100%	70%	50%
	(₹in lakhs)	(₹in lakhs)	(₹in lakhs)
Turnover	300	280	150
Variable cost	200	210	75
Fixed cost	70	50	62

Find out:

(a) the capacity of the merged plant for break-even

(b) the profit at 75% capacity of the merged plant

(c) the turnover from the merged plant to give a profit of ₹28 lakhs.

Ans. (a) 52%; (b) ₹80,50,000; (c) ₹6,00,00,000.

25. A company can make any one of the 3 products X, Y and Z in a year. It can exercise its option only at the beginning of each year. Relevant information about the products for the next year is given below: **[SM]**

	X	Y	Z
Selling Price (₹/unit)	10	12	12
Variable costs (₹/unit)	6	9	7
Market Demand (unit)	3,000	2,000	1,000

	X	Y	Z
Production capacity (unit)	2,000	3,000	900
Fixed costs (₹)	30,000		

Required to compute the opportunity costs for each of the products.

Ans. ₹6000; ₹8000; ₹8000.

26. SK Ltd. has an annual production of 90,000 units for a component. The component cost structure is as below:

Material	₹270 per unit
Labour (25% fixed)	180 per unit
Variable expenses	90 per unit
Fixed expenses	135 per unit
	675 per unit

(a) The purchase manager has an offer from a supplier, who is willing to supply the component at ₹540. Should the component be purchased and production stopped?

(b) Assume the resources now used for this component manufacture are to be used to produce another new product for which the selling price is ₹485. In the latter case material price will be ₹200 per unit. 90,000 units of this product can be produced at the same cost basis as above for labour and other expenses. Discuss whether it would be advisable to direct the resources to manufacture the new product, on the footing that the component presently being produced would, instead of being produced, be purchased from the market.

Ans. (a) Manufacture; (b) Manufacture new product.

27. SK Ltd. manufactures three different products and the following information has been collected from the books of accounts: **[SM]**

	Products		
	S	T	U
Sales Mix	35%	35%	30%
Selling Price	₹300	₹400	₹200
Variable Cost	₹150	₹200	₹120
Total Fixed Costs	₹18,00,000		
Total Sales			₹60,00,000

The company has currently under discussion, a proposal to discontinue the manufacture of Product U and replace it with Product M, when the following results are anticipated:

	Products		
	S	T	M
Sales Mix	50%	25%	25%
Selling Price	₹300	₹400	₹300

	Products		
	S	T	M
Variable Cost	₹150	₹200	₹150
Total Fixed Costs			₹18,00,000
Total Sales			₹64,00,000

Required:

(a) Compute the PV ratio, total contribution, profit and Break-even sales for the existing product mix.

(b) Compute the PV ratio, total contribution, profit and Break-even sales for the proposed product mix.

(c) State whether the proposed sales mix is accepted or not?

Ans. (a) BES = ₹38,29,787; (b) BES = ₹36,00,000; (c) Accept.

28. The following particulars are obtained from costing records of a factory:

Particulars	Product A (per unit) (₹)	Product B (per unit) (₹)
Selling Price	400	1000
Material (₹40 per litre)	80	320
Labour (₹20 per hour)	100	200
Variable Overhead	40	80

Total fixed overheads = ₹30,000.

Comment on the profitability of each product when:

(a) Raw material is in short supply

(b) Production capacity is limited

(c) Sales quantity is limited

(d) Sales value is limited

(e) Only 1,000 litres of raw material is available for both the products in total and maximum sales quantity of each product is 300 units.

Ans. (a) A; (b) B; (c) B; (d) A; (e) A = 300; B = 50.

29. SK Ltd. supplies spare parts to an air craft company MK Ltd. The production capacity of SK Ltd. facilitates production of any one spare part for a particular period of time. The following are the cost and other information for the production of the two different spare parts A and B: **[SM]**

Per unit	Part A	Part B
Alloy usage	1.6 Kg	1.6 Kg
Machine Time: Machine A	0.6 hrs.	0.25 hrs.
Per unit	**Part A**	**Part B**
Machine Time: Machine B	0.5 hrs.	0.55 hrs.

Per unit	Part A	Part B
Target Price (₹)	145	115
Total hours available	Machine A – 4,000 hours	
	Machine B – 4,500 hours	

Alloy available is 13,000 kg @ ₹12.50 per kg

Variable overheads per machine hours: Machine A – ₹80
Machine B – ₹100

Required:

(a) Identify the spare part which will optimize contribution at the offered price.

(b) If MK Ltd. reduces target price by 10% and offers ₹60 per hour of unutilized machine hour, what will be the total contribution from the spare part identified above?

Ans. (a) A; (b) ₹1,53,328.

30. An agriculture based company having 210 hectares of land is engaged in growing three different cereals namely, wheat, rice and maize annually. The yield of the different crops and their selling prices are given below: **[Nov 2022]**

	Wheat	Rice	Mazie
Yield (in kgs per hectare)	2,000	500	100
Selling price (₹per kg)	20	40	250

The variable cost data of different crops are given below:

(all figures in ₹per kg)

Crop	Labour charges	Packaging Materials	Other variable expenses
Wheat	8	2	4
Rice	10	2	1
Maize	120	10	20

The company has a policy to produce and sell all the three kinds of crops. The maximum and minimum area to be cultivated for each crop is as follows:

Crop	Maximum Area (in hectares)	Minimum Area (in hectares)
Wheat	160	100
Rice	50	40
Maize	60	10

You are required to:

(a) Rank the crops on the basis of contribution per hectare

(b) Determine the optimum product mix considering that all the three cereals are to be produced.

(c) Calculate the maximum profit which can be achieved if the total fixed cost per annum is ₹21,45,000.

(assume that there are no other constraints applicable to this company)

Ans. (a) II, I, III; (b) 50; 10; 150; (c) ₹4,30,000.

31. SK Ltd. manufactures medals for winners of athletic events and other contests. Its manufacturing plant has the capacity to product 10,000 medals each month. The company has current production and sales level of 7,500 medals per month. The current domestic market price of the medal is ₹150. **[SM]**

The cost data for the month of August is as under:

	(₹)
Variable costs:	
- Direct materials	2,62,500
- Direct labour costs	3,00,000
- Overhead	75,000
Fixed manufacturing costs	2,75,000
Fixed marketing costs	1,75,000
	10,87,500

SK ltd. has received a special one-time order for 2,500 medals at ₹120 per medal. Required:

(a) Should SK ltd. accept the special order? Why? Explain briefly.

(b) Suppose the plant capacity was 9,000 medals instead of 10,000 medals each month. The special order must be taken either in full or rejected totally. Analyse whether SK Ltd. should accept the special order or not.

Ans. (a) Accept; (b) Accept.

32. The profit for the year of RJ Ltd. works out to 12.5% of the capital employed and the relevant figures are as under:

Sales	₹5,00,000
Direct Materials	₹2,50,000
Direct Labour	₹1,00,000
Variable Overheads	₹40,000
Capital Employed	₹4,00,000

The new Sales Manager who has joined the company recently estimates for next year a profit of about 23% on capital employed, provided the volume of sales is increased by 10% and simultaneously there is an increase in Selling Price of 4% and an overall cost reduction in all the elements of cost by 2%.

Required to find out by computing in detail the cost and profit for the next year, whether the proposal of Sales Manager can be adopted.

Ans. Accept.

33. The following are cost data for three alternative ways of processing the clerical work for cases brought before the LC Court System: **[SM]**

	[A] Manual (₹)	[B] Semi-Automatic (₹)	[C] Fully-Automatic (₹)
Monthly fixed costs:			
Occupancy	15,000	15,000	15,000
Maintenance contract	-	5,000	10,000
Equipment lease	-	25,000	1,00,000
Unit variable costs (per report):			
Supplies	40	80	20
Labour	(5 hrs × ₹40) = 200	(1 hr × ₹60) = 60	(0.25 hr × ₹80) = 20

Required:

(a) Calculate cost indifference points. Interpret your results.

(b) If the present case load is 600 cases and it is expected to go up to 850 cases in near future, select most appropriate on cost considerations?

Ans. (a) 300; 550; 800.

34. SK Ltd. makes two products S and K, whose respective fixed costs are F1 and F2. You are given that the unit contribution of K is one-fifth less than the unit contribution of S, that the total of F1 and F2 is ₹1,50,000, that the BEP of S is 1,800 units (for BEP of S, F2 is not considered) and that 3,000 units is the indifference point between S and K (i.e. S and K make equal profits at 3,000 units volume, considering their respective fixed costs). There is no inventory build-up as whatever is produced is sold. **[SM]**

Required to find out the values of F1 and F2 and units contributions of S and K.

Ans. F1 = ₹90,000; F2 = ₹60,000; Contr. X = ₹50; Contr. Y = ₹40.

35. SK Ltd. supplies you the following standard cost per unit for one of its products.

Direct material	₹1.60
Direct labour	₹1.50
Variable factory overhead	₹1.20
Fixed factory overhead	₹3.00

Production at normal capacity is 2,00,000 units. Variable selling and administrative overhead per unit is ₹0.50 and fixed selling and administrative overhead were ₹75,000 per year. Production and sales data for the year 2017 and year 2018 are as follows:

Units produced in year 2017	2,00,000
Units sold in year 2017	1,60,000
Inventory – 31st Dec. 2017	68,000

Units produced in year 2018 1,50,000
Units sold in year 2018 1,80,000
Selling price in each year was ₹10.50. Prepare Income Statement for the two years under:
(i) Absorption costing, and (ii) Marginal costing

Ans. (i) ₹3,57,000; ₹2,61,000; (ii) ₹2,37,000; ₹3,51,000.

PRACTICE QUESTIONS

36. You are given the following information:

(i) Fixed cost ₹1,50,000
(ii) Variable cost ₹15 per unit
(iii) Selling price is ₹30 per unit

Calculate:

(a) Break-even point
(b) Sales to earn a profit of ₹20,000

Ans. (a) 10,000 units; (b) ₹3,40,000.

37. You are required to: **[SM]**

(a) Determine profit, when sales = ₹2,00,000
Fixed cost = ₹40,000
BEP = ₹1,60,000
(b) Determine sales, when fixed cost = ₹20,000
Profit = ₹10,000
BEP = ₹40,000

Ans. (a) ₹10,000; (b) ₹60,000.

38. You are given the following data: **[SM]**

	Sales	Profit
Year 2020-21	₹1,20,000	₹8,000
Year 2021-22	₹1,40,000	₹13,000

Find out:

(a) PV ratio
(b) B.E. point
(c) Profit when sales are ₹1,80,000
(d) Sales required to earn a profit of ₹12,000
(e) Margin of safety in year 2021-22.

Ans. (a) 25%; (b) ₹88,000; (c) ₹23,000; (d) ₹1,36,000; (e) ₹52,000.

39. The following information is given by SK Ltd: **[SM]**

Margin of Safety	₹1,87,500
Total cost	₹1,93,750
Margin of Safety	3,750 units
Break-even Sales	1,250 units

Required to calculate profit, P/V ratio, BEP Sales (in ₹) and Fixed cost.

Ans. ₹56,250; 30%; ₹62,500; ₹18,750.

40. A company had incurred fixed expenses of ₹4,50,000 with sales of ₹15,00,000 and earned a profit of ₹3,00,000 during the first half year. In the second half, it suffered a loss of ₹1,50,000. **[SM]**

Calculate:

(i) The profit-volume ratio, break-even point and margin of safety for the first half year.

(ii) Expected sales volume for the second half year assuming that selling price and fixed expenses remained unchanged during the second half year.

(iii) The break-even point and margin of safety for the whole year.

Ans. (i) 50%; ₹9,00,000; ₹6,00,000; (ii) ₹6,00,000; (iii) ₹18,00,000; ₹3,00,000.

41. Mr. X has ₹2,00,000 investments in his business firm. He wants a 15% return on his money. From an analysis of recent cost figures, he finds that his variable cost of operating is 60% of sales, his fixed costs are ₹80,000 per year. Show computations to answer the following questions: **[SM]**

(i) What sales volume must be obtained to break even?

(ii) What sales volume must be obtained to get 15 per cent return on investment?

(iii) Mr. X estimates that even if he closed the doors of his business, he would incur ₹25,000 as expenses per year. At what sales would be better off by locking his business up?

Ans. (i) ₹2,00,000; (ii) ₹2,75,000; (iii) ₹1,37,500.

42. A company has fixed costs of ₹90,000, Sales ₹3,00,000 and profit of ₹60,000.

Required to compute:

(a) Sales volume if in the next period, the company suffered a loss of ₹30,000?

(b) What is the margin of safety for a profit of ₹90,000?

Ans. (a) 50%, ₹1,20,000; (b) ₹1,80,000.

43. A company earned a profit of ₹30,000 during the year. If the marginal cost and selling price of the product are ₹8 and ₹10 per unit respectively, find out the amount of margin of safety. **[SM]**

Ans. 20%; ₹1,50,000.

44. (a) If margin of safety is ₹2,40,000 (40% of sales) and P/V ratio is 30% of SK Ltd., calculate its (1) Break even sales, and (2) Amount of profit on sales of ₹9,00,000, **[SM]**

(b) SK Ltd. has earned a contribution of ₹2,00,000 and net profit of ₹1,50,000 of sales of ₹8,00,000. What is its margin of safety?

Ans. (a) (1) ₹3,60,000; (2) ₹1,62,000; (b) ₹6,00,000.

45. During a particular period, ABC Ltd. has furnished the following data: **[Jan 2021]**

Sales ₹10,00,000

Contribution to sales ratio 37% and

Margin of safety is 25% of sales

A decrease in selling price and decrease in the fixed cost could change the "contribution to sales ratio" to 30% and "margin of safety" to 40% of the revised sales. Calculate:

(i) Revised Fixed Cost

(ii) Revised Sales and

(iii) New Break-Even Point

Ans. (i) ₹1,62,000; (ii) ₹9,00,000; (iii) ₹5,40,000.

46. A single product company sells its product at ₹60 per unit. In 2019-20, the company operated at a margin of safety of 40%. The fixed costs amounted to ₹3,60,000 and the variable cost ratio to sales was 80%. **[SM]**

In 2020-21, it is estimated that the variable cost will go up by 10% and the fixed cost will increase by 5%.

(i) Find the selling price required to be fixed in 2020-21 to earn the same P/V ratio as in 2019-20.

(ii) Assuming the same selling price of ₹60 per unit in 2020-21, find the number of units required to be produced and sold to earn the same profit as in 2019-20.

Ans. (i) ₹66; (ii) 85,834 units.

47. An automobile manufacturing company produces different models of Cars. The budget in respect of model 007 for the month of March is as under: **[SM]**

Budgeted Output			**40,000 units**
		₹ in lakhs	**₹ in lakhs**
Net Realisation			2,10,000
Variable Costs:			
Materials		79,200	
Labour		15,600	
Direct expenses		37,200	1,32,000
Specific fixed costs		27,000	
Allocated Fixed costs		33,750	60,750
	Total Costs		1,92,750
	Profit		17,250
	Sales		2,10,000

Calculate:

(i) Profit with 10 percent increase in selling price with a 10 percent reduction sales volume.

(ii) Volume to be achieved to maintain the original profit after a 10 percent rise in material costs, at the originally budgeted selling price per unit.

Ans. (i) ₹28,350 lakhs; (ii) 44,521 units.

48. The following data are available from the budget records of Finesign Women's Handbag Company for the forthcoming period. **[RTP May-2023]**

	(₹)
Selling price per unit	1000
Variable cost per unit:	
Cost of material used	750
Sales commission	50
Total variable cost	800
Annual fixed expenses:	
Rent	7,00,000
Salaries	11,00,000
Other fixed expenses	5,00,000
Total Fixed cost	23,00,000

Although the firm manufactures Bags with different styles, they have identical purchase costs and selling price.

Requirement:

(a) What is the annual break-even point both in terms of units and value?

(b) If the store manager is paid 1 per cent commission on sales, what would be the annual break-even point both in terms of units and value?

(c) If the firm decides to pay a fixed salary of ₹9,00,000 in lieu of sales commission, what would be the annual break-even point in terms of units and value.

(d) Considering break-even point in requirement (a), if the store manager is paid 2 per cent commission on each bag sold in excess of the break-even point, what would be the profit if 20,000 bags were sold.

Ans. (a) 11,500 units; ₹1,15,00,000; (b) 12,106 units; ₹1,21,05,263; (c) 12,800 units; ₹1,28,00,000; (d) ₹15,30,000]

49. PH Gems Ltd. is manufacturing readymade suits. It has annual production capacity of 2,000 pieces. The Cost Accountant has presented following information for the year to the management:

[May 2018]

Particulars	Amount (₹)	Amount (₹)
Sales 1,500 pieces @ ₹1,800 per piece		27,00,000
Direct Material	5,94,200	
Direct Labour	4,42,600	
Overheads (40% Fixed)	11,97,000	22,33,800
Net Profit		4,66,300

Evaluate following options:

(i) If selling price is increased by ₹200, the sales will come down to 60% of the total annual capacity. Should the company increase its selling price?

(ii) The company can earn a profit of 20% on sales if the company provide TIEPIN with ready-made suit. The cost of each TIEPIN is ₹18. Calculate the sales to earn a profit of 20% on sales.

Ans. (i) Accept; (ii) 1,900 units.

50. M/s Gaurav Private Limited is manufacturing and selling two products: **[May 2019]**

'BLACK' and 'WHITE' at selling price of ₹20 and ₹30 respectively.

The following sales strategy has been outlined for the financial year 2019-20:

(i) Sales planned for the year will be ₹81,00,000 in the case of 'BLACK' and ₹54,00,000 in the case of 'WHITE'.

(ii) The selling price of 'BLACK' will be reduced by 10% and that of 'WHITE' by 20%.

(iii) Break-even is planned at 70% of the total sales of each product.

(iv) Profit for the year to be maintained at ₹8,26,200 in the case of 'BLACK' and ₹745,200 in the case of 'WHITE'. This would be possible by reducing the present annual fixed cost of ₹42,00,000 allocated as ₹22,00,000 to 'BLACK' and ₹20,00,000 to 'WHITE'.

You are required to calculate:

(1) Number of units to be sold of 'BLACK' and 'WHITE' to Break even during the financial year 2019-20.

(2) Amount of reduction in fixed cost product-wise to achieve desired profit mentioned at (iv) above.

Ans. (1) 3,15,000; 1,57,500; (2) ₹2,72,200; ₹2,61,200.

51. A company manufactures two types of herbal product A and B. Its budget shows profit figures after apportioning the fixed joint cost of ₹15 lacs in proportion of the numbers of units sold. The budget for 2018, indicates: **[RTP May 2018]**

	A	B
Profit (₹)	1,50,000	30,000
Selling price/unit (₹)	200	120
P/V Ratio (%)	40	50

Required:

Compute the best option among the following, if the company expects that the number of units to be sold would be equal.

(a) Due to exchange in a manufacturing process, the joint fixed cost would be reduced by 15% and the variables would be increase by 7½%.

(b) Price of A could be increase by 20% as it is expected that the price elasticity of demand would be unity over the range of price.

(c) Simultaneous introduction of both the option, viz. (a) and (b) above.

Ans. (a) ₹2,43,000; (b) ₹4,20,000; (c) ₹5,01,000.

52. You are given the following data for the current financial year of SK Ltd.: **[SM]**

Variable cost	60,000	60%
Fixed cost	30,000	30%
Net profit	10,000	10%
Sales	1,00,000	100%

Find out (a) Break-even point; (b) PV Ratio; (c) Margin of safety. Also draw a break-even chart showing contribution and profit.

Ans. (a) 40%; (b) ₹75,000; (c) ₹25,000.

53. A company has three factories situated in north, east and south with its Head Office in Mumbai. The management has received the following summary report on the operations of each factory for a period: **[SM]**

	Sales		**Profit**	
	Actual	**Over/(Under) Budget**	**Actual**	**Over/(Under) Budget**
North	1,100	(400)	135	(180)
East	1,450	150	210	90
South	1,200	(200)	330	(110)

Calculate for each factory and for the company as a whole for the period:

(i) The fixed costs. (ii) break-even sales.

Ans. (i) 360; 660; 330; (ii) ₹800; ₹1,100; ₹600.

54. Top-tech manufacturing company is presently evaluating two possible machines for the manufacture of superior pen-drives. The following information is available: **[May 2022]**

Particulars	**Machine A**	**Machine B**
Selling price per unit	₹400.00	₹400.00
Variable cost per unit	₹240.00	₹260.00
Total fixed costs per year	₹350 lakhs	₹200 lakhs
Capacity (in units)	8,00,000	10,00,000

Required:

(i) Recommend which machine should be chosen?

(ii) Would you change your answer, if you were informed that in near future demand will be unlimited and the capacities of the two machines are as follows?

Machine A – 12,00,000 units

Machine B – 12,00,000 units

Why?

55. SK ltd. manufactures automobiles accessories and parts. The following are the total cost of processing 2,00,000 units: **[SM]**

Direct material cost	₹375 per unit
Direct labour cost	₹80 per unit
Variable factory overhead	₹16 per unit
Fixed factory overhead	₹500 lakhs

The purchase price of the component is ₹485. The fixed overhead would continue to be incurred even when the component is bought from outside. Required:

(a) Should be part be made or bought from outside considering that the present facility when released following a buying decision would remain idle?

(b) In case the released capacity can be rented out to another manufacturer for ₹32,00,000 having good demand. What should be the decision?

Ans. (a) Manufacture; (b) buy from outside.

56. The product mix of SK Ltd. is as under: **[SM]**

	Product M	Product N
Units	54,000	18,000
Selling price	₹7.50	₹15.00
Variable cost	₹6.00	₹4.50

Find the break-even point in units, if the company discontinues product 'M' and replace with product 'O'. the quantity of product 'O' is 9,000 units and its selling price and variable costs respectively are ₹18 and ₹9. Fixed cost is ₹15,000.

Ans. BEP of N = 1,000; BEP of O = 500 units.

57. SK Ltd. produces products 'X', 'Y' and 'Z' and has decided to analyse its production mix in respect of these three products – 'X', 'Y' and 'Z'. **[SM, Nov 2020]**

You have the following information:

	X	Y	Z
Direct materials ₹(per unit)	160	120	80
Variable overheads ₹(per unit)	8	20	12

Direct Labour:

Departments	Rate per Hour (₹)	Hours per unit X	Hours per unit Y	Hours per unit Z
Department A	4	6	10	5
Department B	8	6	15	11

From the current budget, further details are as below:

	X	Y	Z
Annual production at present (in units)	10,000	12,000	20,000

Estimated selling price per unit (₹)	312	400	240
Sales department estimate of possible sales in the coming year (in units)	12,000	16,000	24,000

There is a constraint on supply of labour in Department-A and its manpower cannot be increased beyond its present level. Required:

(i) Identify the best possible product mix of SK Ltd.

(ii) Calculate the total contribution form the best possible product mix.

Ans. (i) X; Y; Z; (ii) ₹28,48,000.

58. SK ltd. produces and sells two product X and Y. The prowduct is highly demanded in the market. Following information relating to both the products are given as under: **[SM]**

	Per Unit (₹)	
	X	**Y**
Direct Materials	140	180
Direct Wages	60	100
Variable Overheads (₹5 per machine hour)	20	40
Selling Price	300	450

The company is facing scarcity of machine hours for working. The availability of machine hours are limited to 60,000 hours in a month. At present, the monthly demand of product X and product Y is 8,000 units and 6,000 units respectively. The fixed expenses of the company are ₹2,25,000 per month.

You are required to:

Determine the product mix that generates maximum profit to the company in the given situation and also calculate the profit of the company.

Ans. Profit = ₹8,70,000.

59. RPP Manufacturers is approached by an international customer for one-time special order similar to one offered to its domestic customers. Per unit data for sales to regular customers is provided below: **[RTP Nov 2022]**

Direct material	₹693
Direct labour	₹315
Variable manufacturing support	₹504
Fixed manufacturing support	₹1092
Total manufacturing costs	₹2604
Markup (50%)	₹1302
Targeted selling price	₹3906

It is provided that RPP Manufactures has excess capacity.

Required:

(a) What is the full cost of the product per unit?

(b) What is the contribution margin per unit?

(c) Which costs are relevant for making the decision regarding this one-time special order? Why?

(d) For RPP Manufactures, what is the minimum acceptable price of this one-time-special order only

(e) For this one-time-only special order, should RPP Manufactures considers a price of ₹2100 per unit? Why or why not?

Ans. (a) ₹2,604; (b) ₹2,394; (c) ₹1,512; (d) ₹1,512; (e) Accept.

60. LR Ltd. is considering two alternative methods to manufacture product it intends to market. The two methods have a maximum output of 50,000 units each and produce identical items with a selling price of ₹25 each. The costs are: **[July 2021]**

	Method – I Semi-Automatic (₹)	Method – II Fully automatic (₹)
Variable cost per unit	15	10
Fixed costs	1,00,000	3,00,000

You are required to calculate:

(i) Cost Indifference Point in units. Interpret your results.

(ii) The Break-even point of each method in terms of units

Ans. (i) 40,000 units; (ii) 10,000; 20,000.

61. SK Ltd. has a production capacity of 2,00,000 units per year. Normal capacity utilization is reckoned as 90%. Standard variable production costs are ₹11 per unit. The fixed costs are ₹3,60,000 per year. Variable selling costs are ₹3 per unit and fixed selling costs are ₹2,70,000 per year. The unit selling price is ₹20. **[SM]**

In the year just ended on 31stMarch, 2019, the production was 1,60,000 units and sales were 1,50,000 units. The closing inventory on 31st March was 20,000 units. The actual variable production costs for the year were ₹35,000 higher than the standard.

(a) Calculate the profit for the year

(i) By absorption costing method and

(ii) By marginal costing method

(b) Explain the difference in the profits

Ans. (a) (i) ₹2,59,375; (ii) ₹2,39,375.

62. SK Ltd. manufactures a single product, SK. The following figures relate to SK for a one-year period. **[SM]**

Activity Level	50%	100%
Sales and production (units)	400	800
	(₹)	(₹)
Sales	8,00,000	16,00,000

Production costs:		
- Variable	3,20,000	6,40,000
- Fixed	1,60,000	1,60,000
Selling and distribution costs:		
- Variable	1,60,000	3,20,000
- Fixed	2,40,000	2,40,000

The normal level of activity for the year is 800 units. Fixed costs are incurred evenly throughout the year, and actual fixed costs are the same as budgeted. There were no stocks of SK at the beginning of the year.

In the first quarter, 220 units were produced and 160 units were sold. Required:

(a) Compute the fixed production costs absorbed by SK if absorption costing is used.

(b) Calculate the under/over recovery of overheads during this period?

(c) Calculate the profit using absorption costing?

(d) Calculate the profit using marginal costing?

Ans. (a) ₹44,000; (b) ₹4,000; (c) ₹40,000; (d) ₹28,000.

63. AB Ltd produces a single product V2 and sells it at a fixed price of ₹2,050 per unit. The production and sales data for first quarter of the year 2023-24 are as follows: **[MTP May 2024]**

	April	May	**June**
Sales in units	4,200	4,500	5,200
Production in units	4,600	4,400	5,500

Actual/budget information for each month was as follows:

Direct materials	4 kilograms at ₹ 120 per kilogram
Direct labour	6 hours at ₹ 60 per hour
Variable production overheads	150% of direct labour
Fixed production overheads	₹ 5,00,000
Fixed selling overheads	₹ 95,000

There was no opening inventory at the start of the quarter. Fixed production overheads are budgeted at ₹ 60,00,000 per annum and are absorbed into products based on a budgeted normal output of 60,000 units per annum.

Required:

(i) Prepare a profit statement for each of the three months using absorption costing principles.

(ii) Prepare a profit statement for each of the three months using marginal costing principles.

(iii) Present a reconciliation of the profit or loss figures given in your answer to (i) and (ii).

64. A meeting of the heads of departments of the Arnav Ltd. has been called to review the operating performance of the company in the last financial year. The head of the production department appraised that during the last year the company could operate at 70% capacity level but in the coming financial year 95% capacity level can be achieved if an additional amount of ₹100 Crore on capex and working capital is incurred.

The head of the finance department has presented that during the last financial year the company had a P/V ratio of 40%, margin of safety and the break-even were ₹50 crore and ₹200 crore respectively.

To the reply to the proposal of increasing the production capacity level to 95%,the head of the finance department has informed that this could be achieved if the selling price and variable cost are reduced by 8% and 5% of sales respectively. Fixed cost will also increase by ₹20 crore due to increased depreciation on additional assets. The additional capital will be arranged at a cost of 15% p.a. from a bank.

In the coming financial year, it has been aimed to achieve an additional profit of ₹10 crore over and above the last year's profit after adjusting the interest cost on the additional capital.

The following points is required to be calculated on urgent basis to put the same in the meeting. You being an assistant to the head of finance, has been asked the followings:

(i) What will be the revised sales for the coming financial year?

(a) ₹ 322.22 Crore (b) ₹ 311.11 Crore

(c) ₹ 300.00 Crore (d) ₹ 324.24 Crore

(ii) What will be the revised break-even point for the coming financial year?

(a) ₹ 222.22 Crore (b) ₹ 252.22 Crore

(c) ₹ 244.44 Crore (d) ₹ 255.56 Crore

(iii) What will be the revised margin of safety for the coming financial year?

(a) ₹ 100 Crore (b) ₹ 58.89 Crore

(c) ₹ 55.56 Crore (d) ₹ 66.66 Crore

(iv) The profit of the last year and for the coming year are:

(a) ₹ 50 Crore & ₹95 Crore respectively (b) ₹ 20 Crore & ₹ 65 Crore respectively

(c) ₹ 20 Crore & ₹ 30 Crore respectively (d) ₹ 45 Crore & ₹ 66.66 Crore respectively

(v) The total cost of the last year and for the coming year are:

(a) ₹ 230 Crore & ₹292.22 (b) ₹ 230 Crore & ₹275 Crore

(c) ₹ 220 Crore & ₹282.22 Crore (d) ₹ 220 Crore & ₹292.22 Crore

Ans. (i) - (a), (ii) - (d), (iii) - (d), (iv) - c, (v) - (a)

36.

(a) Break-even point (BEP) = $\frac{\text{Fixed cost}}{\text{Contribution per unit}} = \frac{1,50,000}{(30-15)} = 10,000$ units

(b) PV Ratio = $\frac{\text{Contribution}}{\text{Sales}} \times 100 = \frac{(30-15)}{30} \times 100 = 50\%$

Required sales = $\frac{\text{Fixed cost+Required profit}}{\text{PV Ratio}} = \frac{1,50,000+20,000}{50\%} = ₹3,40,000$

37.

(i) Break-even sales = $\frac{\text{Fixed cost}}{\text{PV Ratio}}$

$1,60,000 = \frac{40,000}{\text{PV Ratio}}$

PV Ratio = $\frac{40,000}{1,60,000} = 0.25 = 25\%$

Profit = Contribution – Fixed cost = (2,00,000 × 25%) 40,000 = ₹10,000

(ii) Break-even sales = $\frac{\text{Fixed cost}}{\text{PV Ratio}}$

$40,000 = \frac{20,000}{\text{PV Ratio}}$

PV Ratio = $\frac{20,000}{40,000} = 0.50 = 50\%$

Contribution = Fixed cost + Profit

(Sales × 50%) = 20,000 + 10,000

Sales = $\frac{30,000}{50\%} = ₹60,000$

38.

(a) P/V Ratio = $\frac{\text{Change in Profit}}{\text{Change in Sales}} \times 100 = \frac{13,000-8,000}{1,40,000-1,20,000} \times 100 = \frac{5,000}{20,000} \times 100 = 25\%$

(b) Contribution for Year 2021-22 = 1,20,000 × 25%

Fixed cost + Profit = 30,000

Fixed cost + 8,000 = 30,000

Fixed cost = ₹22,000

Break-even sales = $\frac{\text{Fixed Cost}}{\text{P/V Ratio}} = \frac{22,000}{25\%} = ₹88,000$

(c) Profit = Contribution – Fixed cost = (1,80,000 × 25%) 22,000 = ₹23,000

(d) Desired sales (in ₹) = $\frac{\text{Fixed Cost+Desired Profit}}{\text{P/V Ratio}} = \frac{22,000+12,000}{25\%}$ = ₹1,36,000

(e) Margin of Safety = Actual sale – Break-even sales = 1,40,000 – 88,000 = ₹52,000

39. Margin of safety (%) = $\frac{\text{MOS units}}{\text{Totla units}} \times 100 = \frac{3,750}{(3,750+1,250)} \times 100$ = 75%

Total sales = $\frac{\text{MOS}}{\text{MOS \%}} = \frac{1,87,500}{75\%}$ = ₹2,50,000

Profit = Sales – Total cost = 2,50,000 – 1,93,750 = ₹56,250

PV Ratio = $\frac{\text{Profit}}{\text{MOS}(\times)} \times 100 = \frac{56,250}{1,87,500} \times 100$ = 30%

Break-even sales = Total sales × Breakeven sales % = 2,50,000 × (100 – MOS%) = 2,50,000 × 0.25 = ₹62,500

Fixed cost = Contribution – Profit = (2,50,000 × 30%) – 56,250 = ₹18,750

40.

(i) In the First half year

Contribution = Fixed cost + profit = 4,50,000+3,00,000 = ₹7,50,000

P/V ratio = $\frac{C}{S} = \frac{7,50,000}{15,00,000} = 50\%$

Break-even point = $\frac{\text{Fixed cost} - \text{Loss}}{\text{P/V rotio}} = \frac{4,50,000}{50\%}$ = ₹9,00,000

Margin of safety = Actual sales – Break-even point = 15,00,000 – 9,00,000 = ₹6,00,000

(ii) In the second half year

Contribution = Fixed cost – loss = 4,50,000 – 1,50,000 = ₹3,00,000

Expected sales volume = $\frac{\text{Fixed cost} - \text{loss}}{\text{P/V rotio}} = \frac{3,00,000}{50\%}$ = ₹6,00,000

(iii) For the whole year

B.E point = $\frac{\text{Fixed Cost}}{\text{P/V ratio}} = \frac{4,50,000\times 2}{50\%}$ = ₹18,00,000

Margin of safety = $\frac{\text{Profit}}{\text{P/V ratio}} = \frac{30,00,000-1,50,000}{50\%}$ = ₹3,00,000

41. P/V ratio = 100 – 60% = 40%

(i) B.E. Point = $\frac{F}{P/V \text{ ratio}} = \frac{80,000}{40\%}$ = ₹2,00,000

(ii) Return of 15% on ₹2,00,000 = ₹30,000

Add: Fixed cost 80,000

Contribution required 1,10,000

Sales required = $\frac{F+P}{P/V \text{ ratio}} = \frac{1,10,000}{40\%}$ = ₹2,75,000

(iii) When business in lock

Fixed cost ₹25,000

Minimum sales = $\frac{\text{Avoidable FC}}{\text{PV Ratio}} = \frac{(80,000-25,000)}{40\%}$ = ₹1,37,500

Thus Mr. S will be better off if sales are more than ₹1,37,500.

42.

(a) P/V Ratio = $\frac{\text{Fixed Cost+Profit}}{\text{Sales}} \times 100 = \frac{90,000+60,000}{3,00,000} \times 100 = 50\%$

Desired sales (in ₹) = $\frac{\text{Fixed Cost+Desired Profit}}{\text{P/V Ratio}} \times 100$

$= \frac{90,000+(-30,000)}{50\%} \times 100$ = ₹1,20,000

(b) Margin of safety = $\frac{\text{Profit}}{\text{P/V Ratio}} = \frac{90,000}{50\%}$ = ₹1,80,000

43. PV Ratio = $\frac{\text{Contribution}}{\text{Selling price}} \times 100 = \frac{(10-8)}{10} \times 100 = 20\%$

Margin of safety = $\frac{\text{Profit}}{\text{PV Ratio}} = \frac{30,000}{20\%}$ = ₹1,50,000

44.

(a) (1) Margin of safety = 40% of sales

2,40,000 = 40% of sales

Sales = 2,40,000 ÷ 40% = ₹6,00,000

Break-even sales = Sales – Margin of Safety = 6,00,000 – 2,40,000 = ₹3,60,000

(b) Break-even sales = $\frac{\text{Fixed Cost}}{\text{P/V Ratio}}$

$$3,60,000 = \frac{\text{Fixed Cost}}{30\%}$$

Fixed Cost = ₹1,08,000

Given Sales = ₹9,00,000

Profit = Contribution – Fixed Cost = (9,00,000 × 30%) – 1,08,000 = ₹1,62,000

(b) $\text{PV Ratio} = \frac{\text{contribution}}{\text{Sales}} \times 100 = \frac{2,00,000}{8,00,000} \times 100 = 25\%$

$$\text{Margin of safety} = \frac{\text{Profit}}{\text{PV Ratio}} = \frac{1,50,000}{25\%} = ₹6,00,000$$

45. Existing variable cost ratio = 100 – Contribution to sales ratio = 100 – 37% = 63%

Existing variable cost = 10,00,000 × 63% = ₹6,30,000

New variable cost = Existing variable cost = ₹6,30,000

New variable cost ratio = 100 – 30% = 70%

$$\text{New sales} = \frac{6,30,000}{70\%} = ₹9,00,000$$

New Margin of safety = 9,00,000 × 40% = ₹3,60,000

New Break-even point = 9,00,000 – 3,60,000 = ₹5,40,000

New Fixed cost = New Break-even point × PV Ratio = 5,40,000 × 30% = ₹1,62,000

46.

(i) Contribution per unit = Sale price – VC per unit = 60 – (60 × 80%) = ₹12

$$\text{P/V Ratio} = \frac{\text{Contribution per unit}}{\text{Selling price per unit}} \times 100 = \frac{12}{60} \times 100 = 20\%$$

$$\text{BEP} = \frac{\text{Fixed Cost}}{\text{Contribution per unit}} = \frac{3,60,000}{12} = 30,000 \text{ units}$$

Margin of safety is 40%. Therefore, break-even sales will be 60% of units sold.

No. of units sold = BEP (in units) ÷ 60% = 30,000 ÷ 60% = 50,000 units

Profit earned (in year 2010) = Total contribution – Fixed cost = (50,000 × 12) – 3,60,000 = ₹2,40,000

Revised variable cost = ₹48 + 10% = ₹52.80

Revised fixed cost = ₹3,60,000 + 5% = ₹3,78,000

Required P/V ratio (same as of 2018) = 20%

Thus, variable cost ratio = 100 – 20% = 80%

Revised selling price = ₹52.80 ÷ 80% = ₹66

(ii) Required sales volume (for year 2019)

$$= \frac{\text{Fixed cost + desired profit}}{\text{Contribution per unit}} = \frac{3,78,000 + 2,40,000}{60 - 52.80} = 85,834 \text{ units}$$

47.

(i) Budgeted selling price = $\frac{2,10,000 \text{ lakhs}}{40,000 \text{ units}}$ = ₹5,25,000 per unit

Budgeted variable cost = $\frac{1,32,000 \text{ lakhs}}{40,000 \text{ units}}$ = ₹3,30,000 per unit

Increased selling price = ₹5,25,000 +10% = ₹5,77,500 per unit

New volume = 40,000 – 10% = 36,000 units

Statement of Calculation of Profit

Particulars	(₹in lakhs)
Sales (36,000 units × ₹5,77,500)	2,07,900
Less: Variable cost (36,000 units × ₹3,30,000)	1,18,800
Contribution	89,100
Less: Fixed costs	60,750
Profit	28,350

(ii) Budgeted Material cost = 79,200 lakhs , 40,000 units = ₹1,98,000 per unit

Particulars	(₹in lakhs)
Increased material cost (1,98,000 + 10%)	2,17,800
Labour cost (15,600 lakhs ÷ 40,000 units)	39,000
Direct expenses (37,200 lakhs ÷ 40,000 units)	93,000
Variable cost per unit	3,49,800
Budgeted selling price per unit	5,25,000
Contribution per unit (5,25,000 – 3,49,800)	1,75,200

Sales volume = $\frac{\text{fixed cost + profit}}{\text{contribution per unit}} = \frac{(60,750 \text{ lakhs} + 17,250 \text{ lakhs})}{1.752 \text{ lakhs}}$ = 44,521 units

48.

(a) PV Ratio = $\frac{\text{Contribution per unit}}{\text{Selling price per unit}} \times 100 = \frac{(1000 - 800)}{1000} \times 100$ = 20%

Annual BEP in units = $\frac{\text{Fixed cost}}{\text{Contribution per unit}} = \frac{23,00,000}{200}$ = 11,500 units

Annual BEP in value = $\frac{\text{Fixed cost}}{\text{PV Ratio}} = \frac{23,00,000}{20\%}$ = ₹1,15,00,000

(b) Commission on sale per unit = 1% × 1000 = ₹10

Revised PV Ratio = $\frac{(1,000 - 750 - 50 - 10)}{1000} \times 100 = \frac{190}{1000} \times 100$ = 19%

Annual BEP in units = $\frac{\text{Fixed cost}}{\text{Contribution per unit}} = \frac{23,00,000}{190}$ = 12,106 units

Annual BEP in value = $\frac{\text{Fixed cost}}{\text{PV Ratio}} = \frac{23,00,000}{19\%}$ = ₹1,21,05,263

(c) PV Ratio = $\frac{\text{Contribution per unit}}{\text{Selling price per unit}} \times 100 = \frac{(1000-800)}{1000} \times 100$ = 20%

Revised fixed cost = 23,00,000 + 9,00,000 = ₹32,00,000

Annual BEP in units = $\frac{\text{Fixed cost}}{\text{Contribution per unit}} = \frac{32,00,000}{200}$ = 12,800 units

Annual BEP in value = $\frac{\text{Fixed cost}}{\text{PV Ratio}} = \frac{32,00,000}{20\%}$ = ₹1,28,00,000

(d) Annual BEP under requirement (a) is 11,500 units

Margin of safety = 20,000 – 11,500 = 8,500 units

Manager's commission = 8,500 × 1,000 × 2% = ₹1,70,000

Profit = Sales – Cost = (20,000 × 1,000) – (20,000 × 800) – 1,70,000 – 23,00,000
= ₹15,30,000

49.

(i) Evaluation of option (i)

New Selling price = 1,800 + 200 = ₹2,000

New Sales Quantity = 2,000 × 60% = 1,200 Pieces

Particulars	Amount (₹)
Sales (1,200 × ₹2,000)	24,00,000
Less: Direct Material $\left(\frac{5,94,200}{1,500} \times 1,200\right)$	4,75,360
Less: Direct Labour $\left(\frac{4,42,600}{1,500} \times 1,200\right)$	3,54,080
Less: Variable Overheads $\left(\frac{11,97,000 \times 60\%}{1,500} \times 1,200\right)$	5,74,560
Contribution	9,96,000
Less: Fixed Costs (11,97,000 × 40%)	4,78,000
Profit	5,17,200

If the price is increased by ₹200 than quantity is reducing by 20% (300 on 1,500). Through this step, the profit of the firm will rise by ₹50,900 from the existing level. Since there is increase in profit, thus it may be recommended to accept this policy.

(ii) Evaluation of option (ii)

Calculation of P/V Ratio

Selling price per unit	1,800.00
Less: Direct material per unit $\left(\frac{5,94,200}{1,500}\right)$	396.13

Less: cost of Tie pin 18.00

Less: Direct labour per unit $\left(\frac{4,42,600}{1,500}\right)$ 295.07

Less: Variable Overheads $\left(\frac{11,97,000\times 60\%}{1,500}\right)$ 478.80

Contribution 612.00

P/V Ratio = $\frac{612}{1,800}\times 100$ = 34%

Let sales required to earn profit of 20% = y

Desired sales = $\frac{\text{Fixed Cost+Desired Profit}}{\text{P/V Ratio}}$

y = $\frac{4,78,800+0.20y}{34\%}$

0.34y = 4,78,800 + 0.2y

y = ₹34,20,000

Thus, sales required to earn a profit of 20% on sales = ₹34,20,000

Sales units required to earn a profit of 20% of sales = $\frac{34,20,000}{1,800}$ = 1,900 units

50.

(i) Statement showing Break Even Sales

Particulars	BLACK	WHITE
Sales Planned (in ₹)	81,00,000	54,00,000
Break-even sales %	70%	70%
Break-even sales (in ₹) (A)	56,70,000	37,80,000
Selling price per unit (in ₹) (B)	18	24
Break-even sales (in units) (A ÷ B)	3,15,000	1,57,500

(ii) Statement Showing Fixed Cost Reduction

Particulars	BLACK	WHITE
Profit to be maintained (₹) (A)	8,26,200	7,45,200
Margin of Safety (30% × Sales) (B)	24,30,000	16,20,000
P/V Ratio (A ÷ B)	34%	46%
Desired Contribution (Sales × P/V Ratio)	27,54,000	24,84,000
Less: Desired Profit	8,26,200	7,45,200
Target Fixed Cost	19,27,800	17,38,800
Present Fixed Cost	22,00,000	20,00,000
Required reduction in fixed cost	2,72,200	2,61,200

51.

Working Notes:

(1) Contribution per unit of A = 200 × 40% = ₹80

∴ Variable cost per unit of A = 200 – 80 = ₹120

Contribution per unit of B = 120 × 50% = ₹60

∴ Variable cost per unit of A = 120 – 60 = ₹60

(2) Let units sold of A & B = y

Contribution = Fixed cost + Profit

80y + 60y = 15,00,000 + 1,50,000 + 30,000

140y = 16,80,000

y = 12,000

∴ Units sold of each product = 12,000

(a) Statement of Profit

Particulars	Amount (₹)
Contribution of A [{200 – (120 + 7.5%)} × 12,000]	8,52,000
Contribution of B [{120 – (60 + 7.5%)} × 12,000]	6,66,000
Total contribution	15,18,000
Less: Fixed Cost (15,00,000 – 15%)	12,75,000
Profit	2,43,000

(b) Existing total sales of A = 12,000 × 200 = ₹24,00,000

New Selling price of A = 200 + 20% = ₹240

New quantity of A = 24,00,000 ÷ 240 = 10,000 units

Statement of Profit

Particulars	Amount (₹)
Contribution of A [(240 – 120) × 10,000]	12,00,000
Contribution of B [(120 – 60) × 12,000]	7,20,000
Total contribution	19,20,000
Less: Fixed Cost	15,00,000
Profit	4,20,000

(c) Statement of Profit

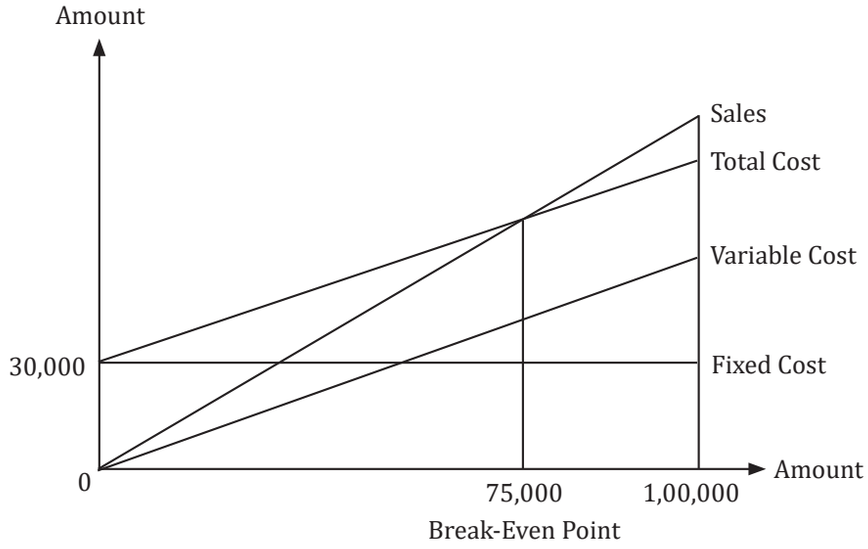
Particulars	Amount (₹)
Contribution of A [{240 – (120 + 7.5%)} × 10,000]	11,10,000
Contribution of B [{120 – (60 + 7.5%)} × 12,000]	6,66,000
Total contribution	17,76,000
Less: Fixed Cost (15,00,000 – 15%)	12,75,000
Profit	5,01,000

A comparison of increase in profit figures under above three options clearly indicates that the option (c) is the best as it has the highest profit of ₹5,01,000.

52. P/V Ratio = $\frac{₹1,00,000 - ₹60,000}{₹1,00,000} = 40\%$

Break Even Point = $\frac{\text{Total fixed cost}}{\text{P/V Ratio}} = \frac{30,000}{40\%} = ₹75,000$

Margin of safety = 1,00,000 – 75,000 = ₹25,000



53.

	North		East		South	
	Sales	**Profit**	**Sales**	**Profit**	**Sales**	**Profit**
Actual	1,100	135	1,450	210	1,200	330
Add: Under/(Over) budgeted	400	180	(150)	(90)	200	110
Budget	1,500	315	1,300	120	1,400	440
P/V Ratio $\left[\frac{\text{Difference in Profit}}{\text{Difference in Sales}}\right]$	$\frac{315-135}{1500-1100}\times 100$ =45%		$\frac{120-210}{1450-1300}\times 100$ =60%		$\frac{440-330}{1400-1200}\times 100$ =55%	
Fixed cost [(Sales × P/v) -Profit]	(1100 × 45%) – 135 = 360		(1450 × 60%) – 210 = 660		(1200 × 55%) – 330 = 330	
B.E. Sales $\left[\frac{\text{Fixed cost}}{\text{P/V ratio}}\right]$	$\frac{360}{45\%} = ₹800$		$\frac{660}{60\%} = ₹1,100$		$\frac{330}{55\%} = ₹600$	

54.

(i) Statement of Profit

Particulars	Machine A	Machine B
Contribution per unit (₹)	400 – 240 = 160	400 – 260 = 140
Capacity (units)	8 lakhs	10 lakhs
Total contribution (₹)	1,280 lakhs	1,400 lakhs
Less: Fixed cost (₹)	350 lakhs	200 lakhs
Profit	930 lakhs	1,200 lakhs

Machine B should be chosen as it gives more profit than Machine A.

(ii) Statement of Profit

Particulars	Machine A	Machine B
Contribution per unit (₹)	400 – 240 = 160	400 – 260 = 140
Capacity (units)	12 lakhs	12 lakhs
Total contribution (₹)	1,920 lakhs	1,680 lakhs
Less: Fixed cost (₹)	350 lakhs	200 lakhs
Profit	1,570 lakhs	1,480 lakhs

Machine A should be chosen as it gives more profit than Machine B.

55.

(a) The decision shall be made comparing the marginal cost of making and buying the component. Here the variable cost of making the component is ₹471 as compared to buying cost of ₹485. The component shall be made by suing own production facility as it would save the company ₹14 per unit.

(b) If by releasing the production facility the company can earn a rental income of ₹32,00,000, then the additional cost of buying from outside and the rental income from releasing the capacity shall be compared for making decision.

Additional cost of buying = ₹14 × 2,00,000 units = ₹28,00,000

Rental income to be received = ₹32,00,000

Additional benefit = ₹4,00,000

The component should be bought from outside as it would save the company ₹4,00,000 in fixed cost.

56. Overall contribution per unit = $\frac{\text{Total contribution}}{\text{Total units}} = \frac{(18-9)(9000)+(15-4.50)(18000)}{27000}$ = ₹10

Overall BEP = $\frac{\text{Fixed cost}}{\text{Overall contribution per unit}} = \frac{15,000}{10}$ = 1,500 units

BEP of O = $1,500 \times \frac{9000}{27,000}$ = 500 units

BEP of N = $1,500 \times \frac{18000}{27,000}$ = 1,000 units

57.

(i) Statement of Contribution per unit and Ranking

Particulars	X (₹)	Y (₹)	Z (₹)
Selling price (A)	312	400	240
(-) Direct material	160	120	80
(-) Direct labour of Dept. A	24	40	20
(-) Direct labour of Dept. B	48	120	88
(-) Variable overheads	8	20	12
Contribution per unit	72	100	40
Hours in Dept. A	6	10	5
Contribution per hour	12	10	8
Ranking	I	II	III

(ii) Statement of Product Mix and Profit

Product	Units	Hours per unit	Material consumed	Contribution
X	12,000	6	72,000	12,000×72 = 8,64,000
Y	16,000	10	1,60,000	16,000×100 = 16,00,000
Z	48,000÷5 = 9,600	5	(Bal. fig.) 48,000	9600 × 40= 3,84,000
	37,600		2,80,000	28,48,000

58.

Statement of Contribution per unit and Ranking

Particulars	X (₹)	Y (₹)
Selling price	300	450
(-) Direct material	140	180
(-) Direct wages	60	100
(-) Variable overheads	20	40
Contribution per unit	80	130
Machine hours per unit	4	8
Contribution per machine hour	20	16.25
Ranking	I	II

Statement of Product Mix and Profit

Product	Units	Machine hour per unit	Material consumed	Contribution
X	8,000	4	32,000	8,000×80 = 6,40,000

Y	28,000÷8 = 3,500	8	(Bal. fig.) 28,000	3,500×130 = 4,55,000
	11,500		60,000	10,95,000
			(-) Fixed Cost	2,25,000
			Profit	8,70,000

59.

(a) Full cost of the product per unit = ₹2,604

(b)

Selling price	₹3,906
(-) Direct material	₹693
(-) Direct labour	₹315
(-) Variable support cost	₹504
Contribution per unit	₹2,394

(c) Costs for decision making are those costs that differ between alternatives, which in this situation are the incremental costs.

Direct material	₹693
Direct labour	₹315
Variable support cost	₹504
Total incremental costs	₹1,512

(d) Minimum acceptable price would be the incremental costs in the short term i.e. ₹1,512

(e) Yes, RPP Manufactures may consider a price of ₹2100 per unit because this price is greater than the minimum acceptable price.

60.

(i) Let cost indifference units = y

Thus, Total cost of Method – I = Total cost of Method – II

1,00,000 + 15y = 3,00,000 + 10y

5y = 2,00,000

y = 40,000

At y = 40,000 units, cost of the two methods will be equal.

If quantity produced is more than 40,000 units than option where variable cost per unit is low i.e. Method - II will have greater benefits in term of cost. If quantity produced is less than 40,000 units than option with lowest fixed cost i.e. Method – I will have greater benefits in terms of total cost.

(ii) Statement of Break-even point

Particulars	Method – I	Method - II
Contribution per unit (A)	25 – 15 = 10	25 – 10 = 15
Fixed cost (B)	1,00,000	3,00,000
Break-even point (in units) (B÷A)	10,000	20,000

61.

Working Note:

Particulars	Year 2019
Opening stock	(Bal. fig.) 10,000
(+) Production	1,60,000
(-) Sales	1,50,000
Closing Stock	20,000

(a) Income Statement under Absorption Costing

Particulars	Amount
Sales (A)	1,50,000×20 = 30,00,000
Variable Production Cost	1,60,000×11 = 17,60,000
Under Recovered Variable Prod. Cost	35,000
Fixed Production	$\frac{3,60,000}{2,00,000\times 90\%}\times 1,60,000 = 3,20,000$
GFC/NFC/COP	21,15,000
(+) Op. Stock FG	10,000×(11 + 2) = 1,30,000
(-) Cl. Stock FG	$\frac{21,15,000}{1,60,000}\times 20,000 = 2,64,375$
COGS	19,80,625
(+) Variable Selling Cost	1,50,000×3 = 4,50,000
(+) Fixed Selling Cost	2,70,000
COS	27,00,625
(+) Under Recovered Fixed Prod. Cost	3,60,000 – 3,20,000 = 40,000
Total Cost (B)	27,40,625
Profit (A – B)	2,59,375

Income Statement under Marginal Costing

Particulars	Year 2019
Sales (A)	1,50,000×20 = 30,00,000
Variable Production Cost	1,60,000×11 = 17,60,000
Under recovered variable Prod. Cost	35,000
Variable GFC/NFC/COP	17,95,000
(+) Op. Stock FG	10,000×11 = 1,10,000
(-) Cl. Stock FG	$\frac{17,95,000}{1,60,000}\times 20,000 = 2,24,375$
Variable COGS (B)	16,80,625
(+) Variable Selling cost	1,50,000×3 = 4,50,000

Variable COS (B)	21,30,625
Contribution (A – B)	8,69,375
(-) Fixed Production Cost	3,60,000
(-) Fixed Selling Cost	2,70,000
Profit	2,39,375

(b) The reasons for difference in profit are

Particulars	Year 2019
Profit as per absorption costing	2,59,375
Add: Opening stock under-valued (1,30,000 – 1,10,000)	20,000
Less: Closing stock under-valued (2,64,375 – 2,24,375)	(40,000)
Profit as per marginal costing	2,39,375

62.

(a) Budgeted fixed production costs = ₹1,60,000

$$\text{Recovery rate} = \frac{\text{Budgeted overheads}}{\text{Normal level of activity}} = \frac{1,60,00}{800} = ₹200 \text{ per unit}$$

Fixed overheads absorbed = 220 units × ₹200 = ₹44,000

(b) Actual production overheads = ₹40,000

Fixed overheads recovered = ₹44,000

Over recovered overheads = 44,000 – 40,000 = ₹4,000

(c) **Profit statement as per Absorption Costing**

Particulars	₹
Sales revenue (160 units × ₹2,000) (A)	3,20,000
Variable cost (220 units × ₹800)	1,76,000
Fixed overheads recovered (220 units × ₹200)	44,000
Total production cost	2,20,000
Add: Opening stock	-
Less: Closing stock $\left(\frac{2,20,000}{220} \times 60\right)$	(60,000)
Cost of goods sold	1,60,000
Less: Adjustment for over recovery of fixed overheads	(4,000)
Add: Variable selling & distribution overheads (160 × ₹400)	64,000
Add: Fixed selling & distribution overheads (2,40,000 × ¼)	60,000
Cost of Sales (B)	2,80,000
Profit (A – B)	40,000

(d) Profit statement as per Marginal Costing

Particulars	₹
Sales revenue (160 units × ₹2,000) (A)	3,20,000
Variable cost (220 units × ₹800)	1,76,000
Variable production cost	1,76,000
Add: Opening stock	-
Less: Closing stock $\left(\frac{1,76,000}{220}\times 60\right)$	(48,000)
Variable cost of goods sold	1,28,000
Add: Variable selling & distribution overheads (160 × ₹400)	64,000
Variable cost of sales (B)	1,92,000
Contribution (A – B)	1,28,000
Less: Fixed production cost	(40,000)
Less: Fixed selling & distribution cost	(60,000)
Profit	28,000

63. (i) Statement of Profit under Absorption Costing

Particulars	April (₹)	May (₹)	June (₹)
Sales (A)	4,200 × 2,050 = 86,10,000	4,500 × 2,050 = 92,25,000	5,200 × 2,050 = 1,06,60,000
Direct material	4,600 × 4 × 120 = 22,08,000	4,400 × 4 × 120 = 21,12,000	5,500 × 4 × 120 = 26,40,000
Direct labour	4,600 × 6 × 60 = 16,56,000	4,400 × 6 × 60 = 15,84,000	5,500 × 6 × 60 = 19,80,000
Variable production overheads	16,56,000 × 150% = 24,84,000	15,84,000 × 150% = 23,76,000	19,80,000 × 150% = 29,70,000
Fixed production overheads	4,600 × 100 = 4,60,000	4,400 × 100 = 4,40,000	5,500 × 100 = 5,50,000
Production cost	68,08,000	65,12,000	81,40,000
Add: Opening stock	-	5,92,000	4,44,000
Less: Closing stock	$\frac{65,12,000}{4,400}\times 300$ = 5,92,000	$\frac{65,12,000}{4,400}\times 300$ = 4,44,000	$\frac{81,40,000}{5,500}\times 600$ = 8,88,000
COGS	62,16,000	66,60,000	76,96,000
Add: Fixed selling OHs	95,000	95,000	95,000
Under/(Over) recovery	5,00,000 – 4,60,000 = 40,000	5,00,000 – 4,40,000 = 60,000	5,00,000 – 5,50,000 = (50,000)
Total Cost (B)	63,51,000	68,15,000	77,41,000
Profit (A – B)	22,59,000	24,10,000	29,19,000

(ii) Statement of Profit under Marginal Costing

Particulars	April (₹)	May (₹)	June (₹)
Sales (A)	4,200 × 2,050 = 86,10,000	4,500 × 2,050 = 92,25,000	5,200 × 2,050 = 1,06,60,000
Direct material	4,600 × 4 × 120 = 22,08,000	4,400 × 4 × 120 = 21,12,000	5,500 × 4 × 120 = 26,40,000
Direct labour	4,600 × 6 × 60 = 16,56,000	4,400 × 6 × 60 = 15,84,000	5,500 × 6 × 60 = 19,80,000
Variable production overheads	16,56,000 × 150% = 24,84,000	15,84,000 × 150% = 23,76,000	19,80,000 × 150% = 29,70,000
Variable Production cost	63,48,000	60,72,000	75,90,000
Add: Opening stock	-	5,52,000	4,14,000
Less: Closing stock	$\frac{63,48,000}{4,600} \times 400$ = 5,52,000	$\frac{75,90,000}{5,500} \times 600$ = 4,14,000	$\frac{75,90,000}{5,500} \times 600$ = 8,28,000
Variable Cost (B)	57,96,000	62,10,000	71,76,000
Contribution (A – B)	28,14,000	30,15,000	34,84,000
Less: Fixed Production OHs	5,00,000	5,00,000	5,00,000
Less: Fixed selling OHs	95,000	95,000	95,000
Profit	22,19,000	24,20,000	28,89,000

(iii) Reconciliation Statement

Particulars	April (₹)	May (₹)	June (₹)
Profit as per Absorption Costing	22,59,000	24,10,000	29,19,000
Add: opening stock overvalued in absorption	-	5,92,000 – 5,52,000 = 40,000	4,44,000 – 4,14,000 = 30,000
Less: Closing stock overvalued in absorption	5,92,000 – 5,52,000 = 40,000	4,44,000 – 4,14,000 = 30,000	8,88,000 – 8,28,000 = 60,000
Profit as per Marginal Costing	22,19,000	24,20,000	28,89,000

Working Note- 1

Particulars	April	May	June
Opening Stock	-	400	300
Add: Production	4,600	4,400	5,500
Less: Sales	4,200	4,500	5,200
Closing stock	400	300	600

64. (i) A Revised Sale $= \dfrac{\text{Revised Fixed Cost} + \text{Expected Profit}}{\text{P/V Ratio}}$

$= \{₹115 + (20 + 10)\} \div 45\% = ₹322.22$ crores

(ii) D Revised Break - even Point $= \dfrac{\text{Fixed Cost}}{\text{P/V Ratio}}$

$= ₹115$ Crore $\div 45\% = ₹255.56$ Crore (Refer working notes)

iii. D Revised Margin of Safety = Revised Sales - Revised Breakeven Sales

$= ₹322.22$ Crores $- ₹255.56$ Crores $= ₹66.66$ Crores.

(iv) C ₹ 20 Crore & ₹ 30 Crore respectively (Refer working note)

(v) A Total cost in last year = ₹ 230 Crore

Total cost in coming year = Variable Cost + Fixed Cost

Revised sales × 55% + 115 Crore = ₹ 322.22 Crore × 55% + ₹ 115 Crore = ₹ 292.22 Crore

Working Note

Present Sales and Profit

Total Sales = Break-even Sales + Margin of Safety

$= ₹200$ Crores $+ ₹50$ Crores

$= ₹250$ Crores

Working Note

Present Sales and Profit

Total Sales = Break-even Sales + Margin of Safety

$= ₹200$ Crores $+ ₹50$ Crores

$= ₹250$ Crores

PN Ratio $= 40\%$

Variable Cost $= 60\%$ of Sales

$= ₹250$ Crores $\times 60\%$

$= ₹150$ Crores

Fixed Cost = Break - even Sales × P/N Ratio

$= ₹200$ Crores $\times 40\%$

$= ₹80$ Crores

Total Cost = ₹150 Crores + ₹80 Crores

= ₹230 Crores

Profit = Total Sales – Total Cost

= ₹250 Crores – ₹230 Crores

Profit = Total Sales – Total Cost

= ₹250 Crores – ₹230 Crores

= ₹20 Crores

Revised Sales	**(₹ in Crores)**
Present Fixed Cost	80.00
Increase in Fixed Cost	20.00
Intrest at 15 percent on Additional Capital (₹100 Crores × 15%)	15.00
Total Revised Fixed Cost (in crore)	115.00
Assuming that the Present Selling Price is ₹100	
Revised Selling Price will be (8% Less)	92.00
New Variable Cost (reduced from 60% to 55%) of Sales (₹92 × 55%)	50.60
Contribution (₹92.00 – ₹50.60)	41.40

$$\text{New P/V Ration} = \frac{₹\,41.40}{₹\,92.00} \times 100$$

$$= 45\%.$$

❑❑❑

15

CHAPTER

Budgets and Budgetary Control

Budgets & Budgetary Control	
Forecast	• It is an assessment of probable future events. • It denotes some degree of flexibility.
Meaning of Budget	• A Budget is a plan quantified in monetary terms, prepared and approved prior to a defined period of time, usually showing planned income to be generated and/or expenditure to be incurred during that period and the capital to be employed to attain a given objectives. • It may be expressed in relation to time, viz., short-term and long-term budget, in relation of function, viz., production cost budget, administration cost budget, research and development cost budget, and so on; in relation behavior, viz., fixed budget and flexible budget.
Characteristics of Budget	• It is a written document. • It is concerned for a definite future period • It is a detailed plan of all the economic activities of a business • It works as a standard and all departmental plans are implemented and evaluated on the basis of budget. • Usually, a budget is prepared in monetary units but budgets for some departments are also prepared in physical units like the budget of production department. • A budget is prepared for the attainment of pre-determined objectives • All the departments of a business unit co-operate for the preparation of a business budget • Every year a budget is prepared and throughout the year is implemented, corrected and controlled therefore, it is a continuous process. • Budget helps management in planning, co-ordination and control. Thus, budget is an effective instrument for management. It also helps to check and evaluate the performance of each department.
Budgeting	• It is the process of designing, implementing and operating of budget. • Its emphasis is the provision of resources to support plans which are being implemented.

Budgetary Control	• CIMA defines Budgetary Control as, "The establishment of departmental budgets relating to the responsibilities of executives to the requirements of a policy, and the continuous comparison of actual with budgeted results, either to secure by individual action the objectives of that policy or to provide a firm basis for its revision." • In other words, it is the system of controlling costs through preparation of budgets. • It is a system of achieving the firm's objectives with minimum possible cost.
Objectives of Budgetary Control	• **Planning –** A budget provides a detailed plan of action for a business over a definite period of time. Planning helps in anticipating many problems long before they may arise and solutions can be sought through careful study. • **Co-ordination –** Budgeting aids managers in co-coordinating their efforts so that objectives of the organization as a whole harmonizes with the objectives of its divisions. • **Communication –** The approved budget copies are distributed to all management personnel which provides not only adequate understanding and knowledge of the programmes and policies to be followed but also alerts about the restrictions to be adhered to. • **Motivation –** A budget is a useful device for motivating managers to perform in line with- the company objectives. • **Control** – Control, as applied to budgeting, is a systematized effort to keep the management informed of whether the planned performance is being achieved or not. For this purpose, a comparison is made between plans and actual performance. • **Performance evaluation –** A budget provides a useful means of informing managers how well they are performing in meeting targets they have previously helped to set.
Steps for Budgetary Control	• Determining the objectives to be achieved • Determining the activities that should be undertaken • Drawing up a plan or a scheme • Laying out a system of comparison • Ensuring that corrective action will be taken
Budgetary Control System	• **Feedback Control or Ex-Post Corrective Control** – In this case, actual results are compared with the budgeted figures and then variances are identified. Based on this correction actions are taken. • **Feedforward Control or Ex-Ante Preventive Control** – It is the opposite of feedback control. In this case, actual results are compared with budget on continuous basis.

Advantages of Budgetary Control	• **Helps in Planning –** Budgeting compels managers to think ahead—to anticipate and prepare for changing conditions. • **Efficiency –** Budgeting co-ordinates the activities of various departments and functions of the business. It increases production efficiency, eliminates waste and controls the costs. • **Revision of Plans –** It helps in identifying the current trends which in turn assist in preparing for future policies. • **Implementation of Standard –** It creates necessary conditions for the introduction of standard costing technique. • **Analysis of Variance –** It provides a yardstick against which actual results can be compared. It shows management where action is needed to remedy a situation. • **Effective Utilization of resources –** It ensures that working capital and all other resources are available for the efficient operation of the business. • **Cost Consciousness –** It creates cost consciousness and introduces an attitude of mind in which waste and efficiency cannot thrive.
Limitations of Budgetary Control	• **The budget plan is based on estimates –** Budgets are based on forecasts and forecasting cannot be an exact science. Absolute accuracy, therefore, is not possible in forecasting and budgeting. • **Danger of rigidity –** A budget programme must be dynamic and continuously deal with the changing business conditions. Budgets will lose much of their usefulness if they acquire rigidity and are not revised with the changing circumstances. • **Expensive technique –** The installation and operation of a budgetary control system is a costly affair as it requires the employment of specialized staff and involves other expenditure which small concerns may find difficult to incur. • **Budgeting is only a tool of management –** Budgeting cannot take the place of management but is only a tool of management. • **Opposition from staff –** Employees may not like to be evaluated and thus oppose introduction of budgetary control system
Preparation of Budgets	• Defining business or organizational objectives • Identification of the key budget factor • Appointment of controller or officer • Preparation of budget manual i.e. booklet specifying the objectives of an organization in relation to its strategy. • Budget Period i.e. period covered by a budget. • Standard of activity or output
Fixed or Static Budget	• It is a budget which is designed to remain unchanged irrespective of the volume of output or turnover attained. • It is rigid budget and is drawn on the assumption that there will be no change in the budgeted level of activity. • It does not provide a meaningful basis for comparison and control. • Fixed budgets are established only for short-term periods when the actual results are not anticipated to differ from the budget estimates.

Features of Fixed budget	• It is prepared for one fixed level of activity. • It does not change with the change in the level of activity • Expenses are not classified into fixed, variable and semi-variable.
Limitations of Fixed budget	• It is misleading. A poor performance may remain undetected and a good performance may go unrealized • It is not suitable for long period • It is also found unsuitable when the conditions of the business are changing constantly. • It is inadequate for control purpose. • It violates logic i.e. comparison should be made between two things with a like base. • Accurate estimates not possible.
Flexible Budget	• It is a budget which is designed to change appropriately with fluctuations in various variables such as output, number of employees etc. by recognizing the difference in behavior between fixed and variable costs.
Utility or importance of Flexible budget	• Comparison based on flexible budget is more realistic and meaningful • Costs can be ascertained easily for any level of activity with the help of flexible budget. • It is helpful in price fixation and sending quotations. • It is helpful in assessing the performance of departmental heads because their performance can be judged in relation to the level of activity attained by the organization. • A flexible budget is very useful for purpose of budgetary control because it corresponds with changes in level of activity.
Advantages of flexible budget	• **Easy calculation –** It helps in easy calculation of the sales, costs and profit of the business of various levels of production capacity. • **Easy adjustment of change –** In flexible budget, adjustments are very simple according to change in business conditions. • **Knowledge about the impact of cost –** The cost is classified into three categories, namely fixed, variable and semi-variable due to which it is very easy to know the real impact of cost factors on business profits. • **Comparable –** The actual cost of production may be easily compared with budgeted cost in business and industry and right decisions may be taken by the management will in time. • **Cost control –** The actual cost may be compared with budgeted cost and steps may be taken to minimize the variances. Hence, it helps the management in controlling cost. • **Determination of production level –** The management can easily select the level of production which shows the profit predetermined by the owners of the business.

Limitations of Flexible Budget

- The formulation of flexible budget is possible only when there is a proper accounting system maintained.
- Flexible budget also required the system of standard costing in business.
- The formulation of flexible budget depends upon availability of cost experts in the business.
- The formulation of flexible budget is possible only when the perfect knowledge about the factors of production and variable business circumstances is available.
- It is very expensive and labour oriented.

Distinguish between Fixed and Flexible Budget

Basis	Fixed Budget	Flexible Budget
1. Flexibility	It is inflexible and doesn't change with the actual volume of output.	It is flexible and changes according to the level of activity.
2. Conditions	It assumes that conditions would remain static.	It is prepared according to changing conditions.
3. Classification of costs	Costs are not classified according to their variability.	Costs are classified according to their variability.
4. Comparison	Comparison between actual and budgeted performance can't be done correctly if the volume of output differs.	Comparisons are more correct and realistic as the changed plan figures are placed against actual costs.
5. Cost control	It has a limited application and is ineffective as tool for cost control.	It has more applications and can be used as a tool for cost control.
6. Forecasting	It is difficult to forecast accurately the result in it.	It clearly shows the impact of various expenses on the operational aspect of business.
7. Ascertainment of costs	It is not possible to ascertain costs correctly in changing circumstances.	Costs can be easily ascertained at different levels of activity under this type of budget.
8. Budget	Only one budget at a fixed level of activity is prepared.	Under it, series of budgets are prepared at different level of activity.

Zero Base Budgeting (ZBB)

- ZBB is a method of budgeting where all activities are revaluated each time a budget is set. Discrete levels of each activities are valued and a combination chosen to match funds available.
- In simple words, ZBB is a method of budgeting which requires each cost element to be specifically justified, as though the activities to which the budget relates were being undertaken for the first time. Without approval, the budget allowance is zero.
- ZBB is simply an extension of the cost Benefit Analysis Method to the area of corporate planning and budgeting.
- ZBB in a way tries to locate those activities which are not essential.

Master Budget or Coordinating Budget	• The Master Budget is the summary Budget incorporating its component functional budgets." Hence, it is also known as 'Coordinating Budget'. • A master budget is prepared for the business as a whole, combining all the budgets for a period into this budget. • This budget includes the budgeted position of the Profit & Loss as well as the Balance Sheet. • This budget is prepared by the Budget Officer. After its preparation, it is submitted to the Budget Committee for its approval. • After approval from Budget Committee it is presented to the Board of Directors for approval. • After the Board of directors approves the summary budget, it is known as master budget.
Secondary/ Functional Budget	• Functional budget is a budget of income or expenditure appropriate to, or the responsibility of a particular function. • A functional budget is one which relates to the individual function in an organisation. • These are prepared by the departments of the business to which it relates.
Sales Budget	• The budget which shows the volume and value of sales of a business/ firm/company during the budget period is known as Sales Budget. • It is also known as 'Revenue Budget'. • This budget is prepared by the Sales Manager with the help of some top management staff and executives. • The purpose of sales budget is not an attempt to estimate or guess what the actual sales will be, but rather to develop a plan with clearly defined objectives towards which the operational effort is directed in order to attain or exceed the objectives. The Sales Budget is, therefore, the foundation of Budgetary Control.
Production Budget	• This budget is prepared after the preparation of Sales Budget, to determine when and how many units of various products are to be produced to fulfill the requirement of Sales Budget. • Budgeted production is equal to projected sales plus closing inventory of finished goods minus opening stock of finished goods. • The Production budget is prepared by the Production Manager and is submitted to the Budget Committee for its approval. • It is a budget of total production that is further classified by product-wise and process-wise.

Plant Utilization Budget	• This budget sets out the plant and machinery requirements to meet the budgeted production during the budget period. • For preparation of plant utilization budget, the plant capacity is expressed in terms of convenient units such as working hours, weight or number of units, etc. • If the plant utilization is more than the plant capacity, the management may think of extra shift working, purchase of new machinery, overtime working, sub-contracting etc. • On the other hand, if the budgeted plant utilization is lesser than the plant capacity, management should consider the ways to increase in sales volume. • The preparation of Plant Budget is essential for the industries, where the cost of machines are very high and where major part of production process is covered by machines.
Direct Material Purchase Budget	• This budget indicates, either in terms of money or of quantity, the expected purchases of raw materials to be made during the budget period to fulfill the production budget. • The Material Budget provides basis for fixing optimum levels of inventory stocks, establishment of control over material usage and Purchase Cost Budget, Maximum and Minimum Stock, Stock Level, EOQ etc. • The purchase director or manager is directly responsible for the preparation and execution of Direct Material Purchase Budget. • There are two states of preparing material budget. First, quantities of different types of direct material are estimated. Secondly, price of each kind of direct material and component is found out to obtain cost of different types of materials and components consumed, in production.
Direct Labour Cost Budget	• Direct labour cost budget represents the hours and cost of total labour force (which may be distributed item-wise, plant-wise, department-wise) required during the budget period. • The labour requirement is first ascertained in terms of grades and trades of workers and their supply through the personnel department is assured. • The labour budget is prepared by the personnel department. The labour budget should be prepared both for direct and indirect labour. • The Direct Labour Budget will ensure that the plan will make the required number of various kinds of labour available at the right time. It is an estimate of labour power to achieve the desired targets of budgeted production.
Direct Expenses Budget	• Direct Expenses Budget signifies the expenses to be incurred on budgeted production during the budget period. • These expenses are directly related with production and change as per proportionate change in the output. • Direct Expenses Budget includes all direct expenses except material and labour related with production. • The amount incurred on these expenses is marginal only and because of this generally, it is not prepared except big companies.

Factory / Production / Manufacturing Overhead Budget	• Factory overheads budget represents the amount of total factory overheads (which may be distributed element-wise, variability-wise, period-wise plant-wise) to be incurred during the budget period. • Production Director or Manager is directly responsible for the preparation and execution of overall factory overheads budget. • Main considerations of preparing these budgets are past experience, present cost and effect of budgeted production on relative cost items during forthcoming budget period. • Manufacturing expenses refers to the aggregate of factory overheads, like, indirect material, indirect labour and other indirect expenses which can be divided into fixed and variable elements
Production Cost Budget	• Production cost budget express the cost of carrying out production plans and programmes set out in production budget. • It summarizes material cost, labour cost and factory overhead for production. • Hence, Production Cost Budget is a summary of Material Budget, Labour Budget, Factory Overheads Budget and Plant utilization Budget.
Office and Administrative Cost Budget	• The Administrative Cost Budget signifies the expenses which are to be incurred on the operating activities of office during the plan period. • It includes all the expenses that are incurred to run the administration whether expenses are of fixed or variable nature. • Administration director/Manager is directly responsible for the preparation and execution of overall Office & Administrative Cost Budget.
Selling & Distribution Overhead Budget	• Selling & Distribution cost budget represents the amount of total selling & distribution cost (which may be distributed element-wise, variability-wise, period-wise, area-wise) to be incurred during the budget period. • Sales Director/Manager is directly responsible for the preparation and execution of overall selling & distribution cost budget. • Fixed selling & distribution costs can be estimated on the basis of the past information and knowledge of any changes which may occur during the ensuing budget period. • Variable selling & distribution costs can be estimated after considering the scheduled sales and operating conditions in the budget period.
Capital Expenditure Budget	• The capital expenditure budget represents the expected expenditure on fixed assets involving huge capital outlay and long-term commitment during the budget period. • It may be long-term or short-term. But, it is usually prepared for a longer period, say, 5 to 10 years. If it is prepared for a longer period, it will have to be broken down into short periods. • Since there is a high degree of inflexibility, recovery of cost will take a long period of time because of the investment in fixed assets. That is why this budget should be coordinated with other budgets, viz., Cash Budget, Factory Overhead Budget, Balance Sheet Budget etc. • Proposal for capital expenditure may be initiated by any one from operating level to top level of management. The request is first appraised by the concerned departmental head, who if project appears to be sound, makes formal request for capital appropriation to top management.

Cash Budget	• Cash budget is based on cash forecasts or estimates which gives information as to what funds would be available at what times, and whether the funds so available would meet the requirement of the time. • Cash budget like any other budget is concerned with future events, events which can be approximated or "best guessed" taking into consideration past results, present strengths and future trends. • Cash Budgets provide a blueprint of the cash inflows and outflows that are expected to occur in the immediate future period. They assist the management in determining the surplus or shortage of funds and to take suitable action.
Performance Budgeting	• It is a technique under which Responsibility centers are established and the targets in terms of physical performance are set for each Responsibility Centre and then expenditures (i.e. inputs in financial terms) are linked with physical performance (i.e. output in physical terms) and performance is evaluated through Periodic Performance Reports. • The concept of performance budgeting is used extensively in the Government and Public Sector undertakings. • In comparison to other budget forms the objectives of performance budgeting is to provide a closer linkage between planning and action and to provide a more common basis for review, control and reporting. • The basic issues involved in the preparation of performance budgets are that of developing work programmes and performance expectations by assigning responsibilities necessary for the attainment of the goals and objectives of the enterprise.
Budget Ratio	• Efficiency Ratio = $\frac{\text{Standard hours}}{\text{Actual hours}} \times 100$ • Activity Ratio = $\frac{\text{Standard hours}}{\text{Budgeted hours}} \times 100$ • Calendar Ratio = $\frac{\text{Available Working days}}{\text{Budgeted working days}} \times 100$ • Standard Capacity Usage Ratio = $\frac{\text{Standard Budgeted hours}}{\text{Max. possible hours}} \times 100$ • Actual Capacity Usage Ratio = $\frac{\text{Actual hours worked}}{\text{Max. possible hours}} \times 100$ • Actual usage of budgeted capacity ratio = $\frac{\text{Actual hours}}{\text{Budgeted hours}} \times 100$

PRACTICAL QUESTIONS

1. A factory which expects to operate 7,000 hours, i.e. at 70% level of activity, furnishes details of expenses as under: **[SM]**

Variable expenses	₹1,260
Semi-variable expenses	₹1,200
Fixed expenses	₹1,800

The semi-variable expenses go up by 10% between 85% and 95% activity and by 20% above 95% activity. Prepare a flexible budget for 80, 90 and 100 per cent activities.

Ans. ₹4,440; ₹4,740; ₹5,040.

2. SK Ltd. manufactures a single product for which market demand exists for additional quantity. Present sales of ₹60,000 per month utilizes only 60% capacity of the plant. Marketing Manager assures that with the reduction of 10% in the price he would be in a position to increase the sale by about 25% to 30%. **[Similar Nov 2020]**

The following data are available:

(i)	Selling price	₹10 per unit
(ii)	Variable cost	₹3 per unit
(iii)	Semi-variable cost	₹6,000 fixed + 50 paise per unit
(iv)	Fixed cost	₹20,000 at present level estimated to be ₹25,000 at 80% output

You are required to prepare the following statements:

(1) The operating profit at 60%, 7s0% and 80% levels at current selling price, and

(2) The operating profits at proposed selling price at the above levels.

Ans. (1) ₹13,000; ₹19,500; ₹21,000; (2) ₹7,000; ₹12,500; ₹13,000.

3. From the following information relating to 2018 and conditions expected to prevail in 2019, prepare a budget for 2019.

2018 Actuals:	₹
Sales	1,00,000 (40,000 units)
Raw materials	53,000
Wages	11,000
Variable overheads	16,000
Fixed overheads	10,000
2019 Prospects:	
Sales	1,50,000 (60,000 units)
Raw material	5% price increase
Wages	10% increase in wage rate
	5% increase in productivity
Additional plant	One lathe ₹28,000
	one lathe drill ₹9,000

Rate of depreciation is 10%.

Ans. ₹11,539.

4. SK Pvt. Ltd. ended with the following Profit/Loss during the year 2018:

			All figures in lakhs of ₹
Sales			35.58
Less: Expenses	Raw materials	7.42	
	Stores	4.88	
	Expenses	20.40	
	Interest	2.00	
	Depreciation	2.00	36.70
Loss for the year			(1.12)

The company had been working at 60% of capacity during 2018. Of the expenses of ₹20.40 lakhs, 25% is variable. In 2019, production/sales volume at 80% of capacity is expected to be achieved. Fixed cost is however expected to increase by ₹1.20 lakhs. Draw the 2019 budget.

Ans. Profit = ₹3.74 lakhs.

5. The profitability statement of SK Ltd. has been summarized as follows:

	₹	₹
Sales		15,00,000
Direct materials	4,50,000	
Direct wages	3,00,000	
Variable overheads	1,20,000	
Fixed overheads	4,40,000	13,10,000
Profit	1,90,000	

The budgeted capacity of the company is ₹20,00,000 but the key factor is sales demand. It is proposed that in order to utilize the existing capacity the selling price of this only product manufactured by the company should be reduced by 5%.

You are required to prepare a forecast statement which should show the effect of the proposed reduction in selling price and include any changes in costs expected during the coming year. The following additional information is given:

(i) Sales forecast ₹19,00,000 (after reduction).
(ii) Direct material prices are expected to increase by 2%.
(iii) Direct wage rates are expected to increase by 5% per unit.
(iv) Variable overheads are expected to increase by 5% per unit.
(v) Fixed overheads will increase by ₹20,000

Ans. Profit - ₹2,40,000.

6. SK Ltd. is currently operating at 75% of its capacity. In the past two years, the levels of operations were 55% and 65% respectively. Presently, the production is 75,000 units. The company is planning for 85% capacity level during the year. The cost details are as follows: **[SM]**

	55% (₹)	65% (₹)	75% (₹)
Direct materials	11,00,000	13,00,000	15,00,000
Direct labour	5,50,000	6,50,000	7,50,000
Factory overheads	3,10,000	3,30,000	3,50,000
Selling overheads	3,20,000	3,60,000	4,00,000

	55% (₹)	65% (₹)	75% (₹)
Administrative overheads	1,60,000	1,60,000	1,60,000
	24,40,000	28,00,000	31,60,000

Profit is estimated @ 20% on sales.

The following increases in costs are expected during the year:

	In percentage
Direct material	8
Direct labour	5
Variable factory overheads	5
Variable selling overheads	8
Fixed factory overheads	10
Fixed selling overheads	15
Administrative overheads	10

Prepare flexible budget for the period next year at 85% level of capacity. Also ascertain profit and contribution.

Ans. Profit = ₹9,46,300; Contribution = ₹14,57,300.

7. Figures regarding sales, cost and profit at 50% capacity are given below:

	₹
Sales	20,00,000
Direct cost	8,00,000
Factory overheads	4,00,000
Office overheads	2,00,000
Selling overheads	3,00,000
Profit	3,00,000

Every 10% increase in sales beyond 50% capacity is possible only after reducing the price by 1% on the base level of 50% capacity. Direct material cost is 25% of the total direct cost at 50% capacity. With every 10% increase in capacity above this level, the price of direct material comes down by 2%. 50% of the factory overheads are fixed and the rest are fully variable. Office overheads are of step characters. Every 10% increase in output results in 2% increase in office overheads over 50% capacity. Selling overheads increase in proportion of sales value. Prepare a flexible budget at 80% capacity level.

Ans. ₹6,45,600.

8. SK Company expects to sell 84,000 units of finished goods over the next 3-months period. The company currently has 44,000 units of finished goods on hand and wishes to have an inventory of 48,000 units at the end of the 3-month period. To produce 1 unit of finished goods requires 4 units of raw materials. The company currently has 2,00,000 units of raw materials on hand and wishes to have an inventory of 2,20,000 units of raw materials on hand at the end of the 3-month period. How many units of raw materials must the SK Company purchase during the 3-month period?

Ans. 3,72,000 units.

9. From the following data, prepare a production budget for SK Ltd.:

Stocks for the budgeted period:

Product	As on 1st January	As on 30th June
A	8,000	10,000
B	9,000	8,000
C	12,000	14,000

Normal loss in production: A = 4%; B = 2% and C = 6%

Requirement to fulfill sales programme:

A. 60,000 units

B. 50,000 units

C. 80,000 units

Ans. 64,583 units; 50,000 units; 87,234 units.

10. SK Ltd. has prepared the following sales budget for the first five months of 2018:

Sales Budget	(Units)
January	10,800
February	15,600
March	12,200
April	10,400
May	9,800

Inventory of finished goods at the end of every month is to be equal to 25% of sales estimate for the next month. On 1st January 2018, there were 2,700 units of product on hand. There is no work in progress at the end of any month.

Every unit of product requires two types of materials in the following quantities:

Material A - 4 Kg Material B - 5 Kg

Materials equal to one half of the requirement of next month's production are to be in hand at the end of every month. This requirement was met on 1st January, 2018. Prepare,

(a) Production Budget (Quantitative) for 1st Quarter

(b) Raw material consumption budget (Quantitative) for 1st Quarter

(c) Material Purchase Budget (Quantitative) for 1st Quarter

Ans. (a) 12,000; 14,750; 11,750.

11. A single product company estimated its sales for the next year, quarter –wise as under: **[SM]**

Quarter	No. of units to be sold
I	30,000
II	37,500
III	41,250
IV	45,000

The opening stock of finished goods is 10,000 units and the company expects to maintain the closing stock of finished goods at 16,250 units at the end of the year. The production pattern in each quarter is based on 80% of the sales of the current quarter and 20% of the next quarter.

The opening stock of raw materials in the beginning of the year is 10,000 kg and the closing stock at the end of the year is required to be maintained at 5,000 kg. Each unit of finished output requires 2 kg of raw materials. The company proposed to purchase the entire annual requirement of raw materials in the first three quarters in the proportion and at the prices given below:

Quarter	Purchase of raw materials % of total annual requirement in quantity	Price per kg ₹
I	30%	2
II	50%	3
III	20%	4

The value of the opening stock of raw materials in the beginning of the year is ₹20,000. You are required to present the following for the next year, quarter-wise:

(a) Production budgets in units

(b) Raw material consumption budget in quantity

(c) Raw material purchase budget in quantity and value

(d) Priced stores ledger card of the raw material using first-in-first out method

12. A company is engaged in the manufacture of specialized sub-assemblies required for certain electronic equipment. The company envisages that in the forthcoming month, June 2019, the sales will take a pattern in the ratio of 3:4:2 respectively of sub-assemblies, ACB, MCB and DP. **[SM]**

The following is the schedule of components required for manufacture:

Sub-assembly	Selling price	Base board	Components requirement		
			IC08	IC12	IC26
ACB	520	1	8	4	2
MCB	500	1	2	10	6
DP	350	1	2	4	8
Purchase price (₹)	a	60	20	12	8

The direct labour time and variable overheads required for each of the sub-assemblies are:

	Labour hours per sub-assembly		Variable overheads per sub-assembly (₹)
	Grade A	Grade B	
ACB	8	16	36
MCB	6	12	24
DP	4	8	24
Direct wage rate per hour (₹)	5	4	-

The laborer work 8 hours a day for 25 days a month. The opening stocks of sub-assemblies and components for June, 2019 are as under:

Sub-assemblies		Components	
ACB	800	Base Board	1,600
MCB	1,200	IC08	1,200
DP	2,800	IC12	6,000
		IC16	4,000

Fixed overheads amount to ₹7,57,200 for the month and a monthly profit target of ₹12 lakhs has been set. The company is eager for a reduction of closing inventories for June, 2019 of sub-assemblies and components by 10% of quantity as compared to the opening stock. Prepare the following budgets for June 2019:

(a) Sales budget in quantity and value
(b) Production budget in quantity
(c) Component usage budget in quantity
(d) Component purchase budget in quantity and value
(e) Manpower budget showing the number of workers and the amount of wages payable.

Ans. (a) Total sales = ₹89,46,000; (b) 6,220; 8,280; 3,920; (c) 18,420; 74,160; 1,23,360; 93,480; (d) ₹47,94,160; (e) ₹14,97,600.

13. SK Ltd. manufactures two products using two types of materials and one grade of labour. Shown below is an extract from the company's working papers for the next month's budget:

	Product-A	Product-B
Budgeted sales (in units)	2,400	3,600
Budgeted material consumption per unit (in kg):		
Material-X	5	3
Material-Y	4	6
Standard labour hours allowed per unit of product	3	5

Material-X and Material-Y cost ₹4 and ₹6 per kg and labours are paid ₹25 per hour. Overtime premium is 50% and is payable, if a worker works for more than 40 hours a week. There are 180 direct workers.

The target productivity ratio (or efficiency ratio) for the productive hours worked by the direct workers in actually manufacturing the products is 80%. In addition the non-productive down-time is budgeted at 20% of the productive hours worked.

There are four 5-days weeks in the budgeted period and it is anticipated that sales and production will occur evenly throughout the whole period.

It is anticipated that stock at the beginning of the period will be:

Product-A = 400 units; Product-B = 200 units;

Material-X = 1,000 kgs; Material-Y = 500 kgs.

The anticipated closing stocks for budget period are as below:

Product-A	4 days sales
Product-B	5 days sales
Material-X	10 days consumption
Material-Y	6 days consumption

Required to calculate the Material Purchase Budget and the Wages Budget for the direct workers, showing the quantities and values, for the next month.

Ans. Material purchase = ₹1,47,800; ₹2,75,616; Hours to be paid = 11,160; 32,250.

14. SR Ltd. is a manufacturer of Garments. For the first three months of financial year 2022-23 commencing on 1st April, 2022, production will be constrained by direct labour. It is estimated that only 12,000 hours of direct labour hours will be available in each month. **[May 2022]**

For market reasons, production of either of the two garments must be at least 25% of the production of the other. Estimated cost and revenue per garment are as follows:

	Shirt (₹)	Short (₹)
Sales price	60	44
Raw materials		
Fabric @12 per metre	24	12
Dyes and cotton	6	4
Direct labour @8 per hour	8	4
Fixed Overhead @4 per hour	4	2
Profit	18	22

From the month of July 2022 direct labour will no longer be a constraint. The company expects to be able to sell 15,000 shirts and 20,000 shorts in July 2022. There will be no opening stock at the beginning of July 2022.

Sales volumes are expected to grow at 10% per month cumulatively thereafter throughout the year. Following additional information is available:

The company intends to carry stock of finished garments sufficient to meet 40% of the next month's sale from July 2022 onwards.

The estimated selling price will be same as above.

Required:

(i) Calculate the number of shirts and shorts to be produced per month in the first quarter of financial year 2022-23 to maximize company's profit.

(ii) Prepare the following budgets on a monthly basis for July, August and September 2022:

(a) Sales budget showing sales units and sales revenue for each product.

(b) Production budget (in units) for each product.

PRACTICE QUESTIONS

15. During the FY 2020-21, SK Limited has produced 60,000 units operating at 50% capacity level. The cost structure at the 50% level of activity is as under: **[SM]**

	(₹)
Direct material	300 per unit
Direct wages	100 per unit
Variable overheads	100 per unit
Direct Expenses	60 per unit
Factory expenses (25% fixed)	80 per unit
Selling and Distribution expenses (80% variable)	40 per unit
Office and administrative expenses (100 % fixed)	20 per unit

The company anticipates that in FY 2021-22, the variable costs will go up by 20% and fixed costs will go up by 15%. The selling price per unit will increase by 10% to ₹880. Required:

(i) Calculate the budgeted profit/loss for the FY 2021.

(ii) Prepare an expense budget on marginal cost basis for the FY 2021-22 for the company at 50% and 60% level of activity and find out the profits at respective levels.

Ans. (i) Profit = ₹60,00,000; (ii) ₹25,44,000; ₹37,15,200.

16. The Accountant of KPMR Ltd. has prepared the following budget for the coming year 2022 for its two products 'AYE' and 'ZYE': **[Dec 2021]**

Particulars	Product 'AYE'	Product 'ZYE'
Production and Sales (in Units)	4,000	3,000
	Amount (in ₹)	**Amount (in ₹)**
Selling price per unit	200	180
Direct material per unit	80	70
Direct labour per unit	40	35
Variable overhead per unit	20	25
Fixed overhead per unit	10	10

After reviewing the above budget, the management has called the marketing team for suggesting some measures for increasing the sales. The marketing team has suggested that by promoting the products on social media, the sales quantity of both the products can be increased by 5%. Also, the selling price per unit will go up by 10%. But this will result in increase in expenditure on variable overhead and fixed overhead by 20% and 5% respectively for both the products.

You are required to prepare flexible budget for both the products:

(i) Before promotion on social media

(ii) After promotion on social media

Ans. Profit – (i) ₹2,00,000; ₹1,20,000 (ii) ₹2,77,200; ₹1,66,950.

17. SK Ltd. normally produce 8,000 units of their product in a month, in their machine shop. For the month of January, they had planned for a production of 10,000 units. Owing to a sudden cancellation of a contract in the middle of January, they could only produce 6,000 units in January. **[SM]**

Indirect manufacturing costs are carefully planned and monitored in the machine shop and the foreman of the shop is paid a 10% of the savings as bonus when in any month the indirect manufacturing cost incurred is less than the budgeted provision.

The foreman has put in a claim that he should be paid a bonus of ₹88.50 for the month of January. The works manager wonders how anyone can claim a bonus when the company has lost a sizeable contract. The relevant figures are as under:

Indirect manufacturing	Expenses for a normal month (₹)	Planned for January (₹)	Actual in costs January (₹)
Salary of foreman	1,000	1,000	1,000
Indirect labour	720	900	600
Indirect material	800	1,000	700
Repairs and maintenance	600	650	600
Power	800	875	740
Tools consumed	320	400	300
Rates and taxes	150	150	150
Depreciation	800	800	800
Insurance	100	100	100
	5,290	5,875	4,990

Do you agree with the works manager? Is the foreman entitled to any bonus for the performance in January? Substantiate your answer with facts and figures. Explain.

Ans. Not entitled for bonus.

18. The cost accountant of manufacturing company provides you the following details for year 2018: **[SM]**

	₹		₹
Direct materials	1,75,000	Other variable cost	80,000
Direct wages	1,00,000	Other fixed costs	80,000
Fixed factory overheads	1,00,000	Profit	1,15,000
Variable factory overheads	1,00,000	Sales	7,50,000

During the year, the company manufactured two products A and B and the output and costs were:

	A	B
Output (units)	2,00,000	1,00,000
Selling price per unit	₹2.00	₹3.50
Direct material per unit	₹0.50	₹0.75
Direct wages per unit	₹0.25	₹0.50

Variable factory overheads are absorbed as a percentage of direct wages. Other variable costs have been computed as: Product A ₹0.25 per unit; and B ₹0.30 per unit.

During 2019, it is expected that the demand for product A will fall by 25% and for B by 50%. It is decided to manufacture a further product C, the cost for which are estimated as follows:

	Product C
Output (units)	2,00,000
Selling price per unit	₹1.75
Direct materials per unit	₹0.40
Direct wages per unit	₹0.25

It is anticipated that the other variable costs per unit will be the same as for product A.

Prepare a budget to present to the management, showing the current position and the position for 2019. Comment on the comparative results.

Ans. Profit increase by ₹10,000 after product C.

19. PJ Ltd. manufactures hockey sticks. It sells the products at ₹500 each and makes a profit of ₹125 on each stick. The Company is producing 5,000 stocks annually by using 50% of its machinery capacity. The cost of each stick is as under:

Direct material	₹150
Direct wages	₹50
Work Overheads	₹125 (50% fixed)
Selling Expenses	₹50 (25% variable)

The anticipation for the next year is that cost will go up as under:

Fixed charges	10%
Direct wages	20%
Direct material	5%

There will not be any change in selling price There is an additional order for 2,000 sticks in the next year. Calculate the lowest price that can be quoted so that the Company can earn the same profit as it earned in the current year?

Ans. ₹486.25.

20. XYZ Ltd. is engaged in the manufacturing of toys. It can produce 4,20,000 toys at its 70% capacity on per annum basis. Company is in the process of determining sales price for the financial year 2020-21. It has provided the following information: **[Jan 2021]**

Direct Material	₹60 per unit
Direct Labour	₹30 per unit
Indirect Overheads:	
Fixed	₹65,50,000 per annum
Variable	₹15 per unit
Semi-variable	₹5,00,000 per annum upto 60% capacity and ₹50,000 for every 5% increase in capacity or part thereof upto 80% capacity and thereafter ₹75,000 for every 10% increase in capacity or part thereof.

Company desires to earn a profit of ₹25,00,000 for the year. Company has planned that the factory will operate at 50% of capacity for the first six months of the year and at 75% of capacity for further three months and for the balance three months, factory will operate at full capacity.

You are required to:

(i) Determine the average selling price at which each of the toy should be sold to earn the desired profit.

(ii) Given the above scenario, advise whether company should accept an offer to sell each Toy at:

(a) ₹130 per Toy

(b) ₹129 per Toy

Ans. (i) ₹128.45.

21. Maharatna Ltd., a public sector undertaking (PSU), produces product A. The company is in process of preparing its revenue budget for the year 2022. The company has the following information which can be useful in preparing the budget: **[RTP May 2022]**

(i) It has anticipated 12% growth rate in sales volume from the year 2021 of 4,20,000 tonnes.

(ii) The sales price of ₹23,000 per tonne will be increases by 10% provided Wholesale Price Index (WPI) increases by 5%.

(iii) To produce one tonne of product A, 2.3 tonnes of raw material are required. The raw material cost is ₹4,500 per tonne. The price of raw material will also increase by 10% if WPI increases by 5%.

(iv) The projected increase in WPI for 2022 is 4%.

(v) A total of 6,000 employees works for the company. The company works 26 days in a month.

(vi) 85% of employees of the company are permanent and getting salary as per 5-year wage agreement. The earnings per manshift (means an employee cost for a shift of 8 hours) is ₹3,000 (excluding terminal benefits). The new wage agreement will be implemented from 1st July 2022 and it is expected that a 15% increase in pay will be given.

(vii) The casual employees are getting a daily wage of ₹850. The wages is liked to Consumer Price Index (CPI). The present CPI is 165.71 points and it is expected to be 173.59 points in 2022.

(viii) Power cost for the year 2021 is ₹42,00,000 for 7,00,000 units (1 unit = 1 Kwh). 60% of power is used for production purpose (directly related to production volume) and remaining are for employee quarters and administrative offices.

(ix) During the year 2021, the company has paid ₹60,00,000 for safety and maintenance works. The amount will increase in proportion to the volume of production.

(x) During the year 2021, the company has paid ₹1,20,000 for the purchase of diesel to be used in car hired for administrative purposes. The cost of diesel will increase by 15% in year 2022.

(xi) During the year 2021, the company has paid ₹6,00,000 for car hire charges (excluding fuel cost). In year 2022, the company has decided to reimburse the diesel cost to the car rental company. Doing this will attract 5% GST on Reverse Charge Mechanism (RCM) basis on which the company will not get GST input credit.

(xii) Depreciation on fixed assets for the year 2021 is ₹80,40,00,000 and it will be 15% lower in 2022.

Required to prepare revenue (Flexible) budget for the year 2022 and also the show the budgeted profit/loss for the year.

Ans. Loss ₹1273.043.

22. SK Ltd. is drawing a production plan for its two products Minimax (MM) and Heavyhigh (HH) for the year 2019-20. The company's policy is to old closing stock of finished goods at 25% of the anticipated volume of sales of the succeeding month. The following are the estimated data for two products: **[SM]**

	Minimax (MM)	Heavyhigh (HH)
Budgeted Production units	1,80,000	1,20,000
	(₹)	(₹)
Direct material cost per unit	220	280
Direct labour cost per unit	130	120
Manufacturing overhead	4,00,000	5,00,000

The estimated units to be sold in the first four months of the year 2019-20 are as under:

	April	May	June	July
Minimax	8,000	10,000	12,000	16,000
Heavyhigh	6,000	8,000	9,000	14,000

Prepare production budget for the first quarter in monthwise.

Ans. Total 32,000 units; 25,000 units.

23. SK Glass Company requires you to present the budget for the next year from the following information: **[SM]**

Sales:	
Toughened Glass	₹6,00,000
Bent Glass	₹2,00,000
Direct material cost	60% of sales
Direct wages	20 workers @ ₹150 per month
Factory overheads:	
Indirect labour –	
Works manager	₹500 per month
Foreman	₹400 per month
Stores and spares	2.5% on sales
Depreciation on machinery	₹12,600
Light and Power	₹3,000
Repairs and maintenance	₹8,000
Other Sundries	10% on direct wages
Administration, selling and distribution expenses	₹30,000 per year

Ans. Profit = ₹1,96,000.

24. A department of company SK attains sale of ₹6,00,000 at 80 per cent of its normal capacity and its expenses are given below: **[SM]**

Administration costs:	(₹)
Office salaries	90,000
General expenses	2 per cent of sales
Depreciation	7,500
Rates and taxes	8,750
Selling costs:	
Salaries	8 per cent of sales
Travelling expenses	2 per cent of sales
Sales office expenses	1 per cent of sales
General expenses	1 per cent of sales
Distribution costs:	
Wages	15,000
Rent	1 per cent of sales
Other expenses	4 per cent of sales

Prepare flexible administration, selling and distribution costs budget, operating at 90 percent, 100 percent and 110 percent of normal capacity.

Ans. ₹2,49,500; ₹2,63,750; ₹2,78,000.

25. Pentax Limited has prepared its expense budget for 20,000 units in its factory for the year 2013 as detailed below:

	₹per unit
Direct materials	50
Direct labour	20
Variable overhead	15
Direct expenses	6
Selling expenses (20% fixed)	15
Factory expenses (100% fixed)	7
Administration expenses (100% fixed)	4
Distribution expenses (85% variable)	12
Total	129

Prepare an expense budget for the production of 15,000 units and 18,000 units.

Ans. ₹20,14,000; ₹23,53,600.

26. PSV Ltd. manufactures and sells a single product and estimated the following related information for the period November, 2020 to March, 2021. **[July 2021]**

Particulars	November, 2020	December, 2020	January, 2021	February, 2021	March, 2021
Opening Stock of Finished goods (in Units)	7,500	3,000	9,000	8,000	6,000
Sales (in Units)	30,000	35,000	38,000	25,000	40,000
Selling Price per unit (in ₹)	10	12	15	15	20

Additional information:

Closing stock of finished goods at the end of march, 2021 is 10,000 units

Each unit of finished output requires 2kg of Raw Material 'A' and 3kg of Raw Material 'B'.

You are required to prepare the following budgets for the period November, 2020 to March 2021 on monthly basis:

(i) Sales budget (in ₹)

(ii) Production Budget (in units) and

(iii) Raw material budget for raw material 'A' and 'B' separately (in units)

27. SK ltd. produces and markets a very popular product called 'X'. The company is interest in presenting its budget for the second quarter of the year. The following information are made available for this purpose: **[SM]**

(i) It expects to sell 1,50,000 bags of 'X' during the second quarter at the selling price of ₹1,200 per bag.

(ii) Each bag of 'X' requires 2.5 mtr. Of raw-material 'Y' and 7.5 mtr. of raw-material 'Z'.

(iii) Stock levels are planned as follows:

Particulars	Beginning of Quarter	End of Quarter
Finished Bags of 'X' (Nos.)	45,000	33,000
Raw-material 'Y' (mtr.)	96,000	78,000
Raw-material 'Z' (mtr.)	1,71,000	1,41,000
Empty Bags (Nos.)	1,11,000	84,000

(iv) 'Y' cost ₹160 per mtr., 'Z' costs ₹30 per mtr. and 'Empty Bag' costs ₹110 each.

(v) It requires 9 minutes of direct labour to produce and fill one bag of 'X'. Labour cost is ₹70 per hour.

(vi) Variable manufacturing costs are ₹60 per bag. Fixed manufacturing costs ₹40,00,000 per quarter.

(vii) Variable selling and administration expenses are 5% of sales and fixed administration and selling expenses are ₹3,75,000 per quarter.

Required:

(i) Prepare a production budget for the said quarter in quantity.

(ii) Prepare a raw-material purchase budget for 'Y', 'Z' and 'Empty Bags' for the said quarter in quantity as well as in rupees.

(iii) Compute the budgeted variable cost to produce one bag of 'X'.

28. An electronic gadget manufacturer has prepared sales budget for the next few months. In this respect, following figures are available: **[Nov 2018]**

Month	Electronic gadgets' sales
January	5,000 units
February	6,000 units
March	7,000 units
April	7,500 units
May	8,000 units

To manufacture an electronic gadget, a standard cost of ₹1,500 is incurred and it is sold through

dealers at an uniform price of ₹2,000 per gadget to customers. Dealers are given a discount of 15% on selling price.

Apart from other materials, two units of batteries are required to manufacture a gadget. The company wants to hold stock of batteries at the end of each month to cover 30% of next month's production and to hold stock of manufactured gadgets to cover 25% of the next month's sale. 3,250 units of batteries and 1,200 units of manufactured gadgets were in stock on 1st January.

Required:

(i) Prepare production budget (in units) for the month of January, February, March and April

(ii) Prepare purchase budget for batteries (in units) for the month of January, February and March and calculate profit for the quarter ending on March.

29. AB manufacturing Company manufactures two products A and B. Both Products use a common Raw Material 'C'. The Raw Material 'C' is purchased at the rate of ₹45 per kg from the Market. The Company has made estimates for the year ended 31st March, 2018 (the budget period) as under: **[Nov 2018]**

	Product A	Product B
Sales in Units	36,000	16,700
Finished goods stock increase by year-end (in Units)	860	400
Post-production Rejection Rate (%)	3	5
Material 'C' per completed Unit, net of wastage	4 kg	5 kg
Material 'C' wastage in %	5	4

Additional information available is as under:

Usage of Raw Material 'C' is expected to be at a constant rate over the period.
Annual cost of holding one unit of Raw Material 'C' in Stock is 9% of the Material Cost.
The cost of placing an order is ₹250 per order.

You are required to:

(i) Prepare Functional Budgets for the year ended 31st March, 2018 under the following categories:

(*a*) Production Budget for Products A and B in Units

(*b*) Purchase Budget for Raw Material 'C' in kg and value.

(ii) Calculate the Economic Order Quantity (EOQ) in kg for Raw Material 'C'.

30. A Vehicle manufacturer has prepared sales budget for the next few months, and the following draft figures are available: **[RTP May 2020]**

Month	No. of vehicles
October	40,000
November	35,000
December	45,000
January	60,000
February	65,000

To manufacture a vehicle, a standard cost of ₹11,42,800 is incurred and sold through dealers at uniform selling price of ₹17,14,200 to customers. Dealers are paid 15% commission on selling price on sale of a vehicle.

Apart from other materials four units of Part-X are required to manufacture a vehicle. It is a policy

of the company to hold stocks of Part-X at the end of each month to cover 40% of next month's production. 48,000 units of Part-X are in stock as on 1st October. There are 9,500 nos. of completed vehicles are in stock as on 1st October and it is policy to have stocks at the end of each month to cover 20% of the next month's sales.

You are required to:

(a) Prepare Production budget (in nos.) for the month of October, November, December and January.

(b) Prepare a Purchase budget for Part-X (in units) for the months of October, November and December.

(c) Calculate the budgeted gross profit for the quarter October to December.

31. SK Ltd. manufactures two products X and Y and sells them through two divisions East and West. For the purpose of submission of sales budget to the budget committee the following information has been made available: **[SM, RTP Nov 2023]**

Budgeted sales for the current year were:

Product	East	West
X	400 at ₹9	600 at ₹9
Y	300 at ₹21	500 at ₹21

Actual sales for the current year were:

Product	East	West
X	500 at ₹9	700 at ₹9
Y	200 at ₹21	400 at ₹21

Adequate market studies reveal that product X is popular but under-priced. It is observed that if price of X is increased by ₹1, it will find a ready market. On the other hand, Y is a over-priced to customers and market could absorb more if sales price of Y be reduced by ₹1. The management has agreed to give effect to the above price changes.

From the information based on these price changes and reports from salesmen, the following estimates have been prepared by divisional managers:

Percentage increase in sales over budget:

Product	East	West
X	+10%	+5%
Y	+20%	+10%

With the help of an intensive advertisement campaign the following additional sales above the estimated sales of divisional managers are available:

Product	East	West
X	60	70
Y	40	50

You are required to prepare a budget for sales incorporating the above estimates and also show the budgeted and actual sales of the current year.

32. SK School has a total of 180 students consisting of 6 sections with 30 students per section. The school plans for a picnic around the city during the weekend to places such as the zoo, the amusement park, the planetarium etc. A private transport operator has come forward to lease out the buses for taking the students. Each bus will have a maximum capacity of 50 (excluding 2 seats reserved for the teachers accompanying the students). The school will employ two teachers for each bus, paying them an allowance of 500 per teacher. It will also lease out the required number of buses. The following are the other cost estimates: **[MTP May 2024]**

	Cost per student
Breakfast	₹50
Lunch	₹100
Tea	₹100
Entrance fee at zoo	₹20
Rent per bus	₹6500
Special permit fee per bus	₹500
Block entrance fee at the planetarium	₹2500
Prizes to students for games	₹500

No costs are incurred in respect of the accompanying teachers (except the allowance of 500 per teacher) You are required to prepare:

(a) A flexible budget estimating the total cost for the levels of 60, 90, 120, 150 and 180 students. Each item of cost is to be indicated separately.

(b) Compare the average cost per student at these levels.

(c) What will be your conclusions regarding the break-even level of students if the school proposes to collect 400 per student?

Ans. (a) 29,800; 35,200; 48,600; 54,000; 67,400; (b) 496.67; 391.11; 405.00; 360.00; 374.44; (c) 123 and 159

33. The following extract is taken from the overhead budget of X:

Budgeted activity	50%	75%
Budgeted overhead (₹)	30,00,000	40,00,000

What would be the budgeted overhead for 60% level of activity:

(a) ₹ 32,00,0000 (b) ₹ 34,00,000 (c) ₹ 30,00,000 (d) ₹ 36,00,000

Ans. (b)

SOLUTION OF PRACTICE QUESTIONS

15.

(i) Calculation of Budgeted Profit for the year FY 2021-22

	60,000 Units	
	Per Unit	**Total**
Sales (A)	800.00	4,80,00,000
Variable Cost		

Direct material	300.00	1,80,00,000
Direct wages	100.00	60,00,000
Variable overheads	100.00	60,00,000
Direct expenses	60.00	36,00,000
Variable factory exp. (80.75%)	60.00	36,00,000
Variable selling exp. (40.80%)	32.00	19,20,000
Total Variable cost (B)	652	3,91,20,000
Fixed Cost		
Office and admin. Exp. (100%)	-	12,00,000
Fixed factory exp. (25%)	-	12,00,000
Fixed selling & dist. Exp. (20%)	-	4,80,000
Total Fixed cost (C)	-	28,80,000
Total cost (B+C = D)	-	4,20,00,000
Profit (A – D)	-	60,00,000

(ii) Expenses Budget for the year FY 2022-23 at 50% & 60% level

	60,000 units		72,000 units	
	Per Unit	Total	Per Unit	Total
Sales (A)	880	5,28,00,000	880	6,33,60,000
Variable Cost				
Direct material	360.00	2,16,00,000	360.00	2,59,20,000
Direct wages	120.00	72,00,000	120.00	86,40,000
Variable overheads	120.00	72,00,000	120.00	86,40,000
Direct expenses	72.00	43,20,000	72.00	51,84,000
Variable factory exp. (80×75%)	72.00	43,20,000	72.00	51,84,000
Variable selling exp. (40×80%)	38.40	23,04,000	38.40	27,64,800
Total Variable cost (B)	782.40	4,69,44,000	782.40	5,63,32,800
Fixed Cost				
Office and admin. Exp. (100%)	-	13,80,000	-	13,80,000
Fixed factory exp. (25%)	-	13,80,000	-	13,80,000
Fixed selling & dist. Exp. (20%)	-	5,52,000	-	5,52,000
Total Fixed cost (C)	-	33,12,000	-	33,12,000
Total cost (B + C = D)	-	5,02,56,000	-	5,96,44,800
Profit (A – D)	-	25,44,000	-	37,15,200

16. (i) Flexible Budget (Before promotion)

Particulars	Product AYE	Product ZYE	Total
Sales	4,000 × 200 = 8,00,000	3,000 × 180 = 5,40,000	13,40,000
Less: Direct Material	4,000 × 80 = 3,20,000	3,000 × 70 = 2,10,000	5,30,000
Less: Direct labour	4,000 × 40 = 1,60,000	3,000 × 35 = 1,05,000	2,65,000
Less: Variable OHs	4,000 × 20 = 80,000	3,000 × 25 = 75,000	1,55,000
Less: Fixed OHs	4,000 × 10 = 40,000	3,000 × 10 = 30,000	70,000
Profit	2,00,000	1,20,000	3,20,000

(ii) Flexible Budget (After promotion)

Particulars	Product AYE	Product ZYE	Total
Sales	4,200 × 220 = 9,24,000	3,150 × 198 = 6,23,700	15,47,700
Less: Direct Material	4,200 × 80 = 3,36,000	3,150 × 70 = 2,20,500	5,56,500
Less: Direct labour	4,200 × 40 = 1,68,000	3,150 × 35 = 1,10,250	2,78,250
Less: Variable OHs	4,200 × 24 = 1,00,800	3,150 × 30 = 94,500	1,95,300
Less: Fixed OHs	40,000 + 5% = 42,000	30,000 + 5% = 31,500	73,500
Profit	2,77,200	1,66,950	4,44,150

17. Flexible Budget (for the month of January)

Indirect manufacturing	Nature of cost	Expenses for a normal month	Planned expenses for January	Expenses as per flexible budget for the month of January	Actual expenses of the month of January	Difference for Increased or (Decreased)
	(1)	(₹) (2)	(₹) (3)	(₹) (4)	(₹) (5)	(₹) (6 = 5 – 4)
Salary of foreman	Fixed	1,000	1,000	1,000	1,000	Nil
Indirect labour	Variable	720	900	540	600	60
(Refer to working note 1)						
Indirect material	Variable	800	1,000	600	700	100
(Refer to working note 2)						
Repairs and maintenance	Semi-variable	600	650	550	600	50
(Refer to working note 3)						
Power	Semi-variable	800	875	725	740	15
(Refer to working note 4)						
Tools consumed	Variable	320	400	240	300	60

Indirect manufacturing	Nature of cost	Expenses for a normal month	Planned expenses for January	Expenses as per flexible budget for the month of January	Actual expenses of the month of January	Difference for Increased or (Decreased)
(Refer to working note 5)						
Rates and taxes	Fixed	150	150	150	150	Nil
Depreciation	Fixed	800	800	800	800	Nil
Insurance	Fixed	100	100	100	100	Nil
Total		5,290	5,875	4,705	4,990	285

Conclusion: The above statement of flexible budget clearly shows that the concern's expenses in the month of January have increased from ₹4,705 to ₹4,990. Under such circumstances the Foreman of the company is not at all entitled for any performance bonus in January.

Working Notes:

1. Indirect labour cost per unit = $\frac{720}{8,000}$ = ₹0.09

   Indirect labour for 6,000 units = 6,000 × 0.09 = ₹540

2. Indirect material cost per unit = $\frac{800}{8,000}$ = ₹0.10

   Indirect material for 6,000 units = 6,000 × 0.10 = ₹600

3. According to high and low point method of segregating semi-variable cost into fixed and variable components, following formula may be used.

   Variable cost of repair and maintenance per unit = $\frac{\text{Change in expense level}}{\text{Change in output level}} = \frac{650 - 600}{2,000}$ = ₹0.025

   For 8,000 units: Total variable cost of repair & maintenance = 8,000 × 0.025 = ₹200

   Fixed repair & maintenance cost = ₹600 – 200 = ₹400

   For 6,000 units: Total cost of repair & maintenance = (6,000 × 0.025) + 400 = ₹550

4. Variable cost of power per unit = $\frac{875 - 800}{2,000}$ = ₹0.0375

   For 8,000 units: Total variable cost of power = 8,000 × 0.0375 = ₹300

   Fixed repair & maintenance cost = ₹800 – 300 = ₹500

   For 6,000 units: Total cost of repair & maintenance = (6,000 × 0.0375) + 500 = ₹725

5. Tools consumed cost for 6,000 units = $\frac{320}{8,000} \times 6,000$ = ₹240

18. Budget Showing current Position and Position for 2019

Particulars	Current Position			Position for 2019			
	A	B (A+B)	Total	A	B	C (A+B+C)	Total
Sales (units)	2,00,000	1,00,000	-	1,50,000	50,000	2,00,000	-
A. **Sales** (₹)	₹ 4,00,000	₹ 3,50,000	₹ 7,50,000	₹ 3,00,000	₹ 1,75,000	₹ 3,50,000	₹ 8,25,000
Direct materials	1,00,000	75,000	1,75,000	75,000	37,500	80,000	1,92,500
Direct wages	50,000	50,000	1,00,000	37,500	25,000	50,000	1,12,500
Factory overhead (var)	50,000	50,000	1,00,000	37,500	25,000	50,000	1,12,500
Other variable costs	50,000	30,000	80,000	37,500	15,000	50,000	1,02,500
B. **Material cost**	2,50,000	2,05,000	4,55,000	1,87,500	10,25,000	2,30,000	5,20,000
C. **Contribution** (A-B)	1,50,000	1,45,000	2,95,000	1,12,5000	72,500	1,20,000	3,05,000
Fixed cost: Factory			1,00,000				1,00,000
Other			80,000				80,0000
D. Total fixed cost			1,80,000				1,80,000
Profit (C – D)			1,15,000				1,25,000

Comments: Introduction of product C is likely to increase profit by ₹10,000 (i.e. from ₹1,15,000 to ₹1,25,000) in 2019 as compared to 2018 Therefore, introduction of product C is recommended.

19. Statement of calculation of selling price

Particulars	Amount (₹)
Direct Material [(150 + 5%) × 7,000]	11,02,500
Direct Wages [(50 + 20%) × 7,000]	4,20,000
Variable Works Overhead [125 × 50% × 7,000]	4,37,500
Fixed Works Overhead [125 × 50% × 5,000 × 110%]	3,43,750
Variable Selling Expenses [50 × 25% × 7,000]	87,500
Fixed Selling Expenses [50 × 75% × 5,000 × 110%]	2,06,250
Total Cost	25,97,500
Add: Desired Profit (125 × 7,000)	8,75,000
Total Sales Value	34,72,500
Less: Existing Sales from 5,000 units [5,000 × 500]	25,00,000
Sales value to be obtained from remaining 2,000 units (A)	9,72,500
Sale units (B)	2,000
Selling price per unit (A ÷ B)	486.25

20.

(i) Statement of Cost

Particulars	Amount
Direct material (4,12,500 × 60)	2,47,50,000
Direct wages (4,12,500 × 30)	1,23,75,000
Prime Cost	**3,71,25,000**
Factory Overheads:	
Fixed expenses	65,50,000
Variable expenses (4,12,500 × 15)	61,87,500
Semi-variable expenses (w.n.-1)	6,25,000
Work Cost/ COP/ COGS/COS	**5,04,87,500**
Add: Required profit	25,00,000
Total Sales	**5,29,87,500**
Total Units	4,12,500
Selling price per unit	**128.45**

Working note – 1

For First 6 months = $5,00,000 \times \frac{6}{12}$ = 2,50,000

For next 3 months = $(5,00,000 + 50,000 + 50,000 + 50,000) \times \frac{3}{12}$ = 1,62,500

For balance 3 months = $(5,00,000 + 50,000 + 50,000 + 50,000 + 50,000 + 75,000 + 75,000) \times \frac{3}{12}$
= 2,12,500

Total Semi Variable expenses = 2,50,000 + 1,62,500 + 2,12,500 = ₹6,25,000

Working Note – 2

Maximum capacity p.a. = 4,20,000 ÷ 70% = 6,00,000 units

Units in first 6 months = 6,00,000 × 50% × (6/12) = 1,50,000 units

Units in next 3 months = 6,00,000 × 75% × (3/12) = 1,12,500 units

Units in balance 3 months = 6,00,000 × 100% × (3/12) = 1,50,000 units

Total units produced = 1,50,000 + 1,12,500 + 1,50,000 = 4,12,500 units

(ii)

	(a)	(b)
Selling price per unit	130	129
Less: Variable cost per unit	105	105
Contribution per unit	25	24

Unutilized plant capacity without changing cost = 4,20,000 – 4,12,500 = 7,500 units

Thus, if the company has order upto 7,500 units than it can accept the offer for goods either at 130 or 129 at both levels as contribution will increase which in turn increase the profit.

For order beyond 7,500 units, the acceptability of the offer will depend on other cost and the benefit involved beyond that level.

21.

Revenue Budget (Flexible Budget) of Maharatna Ltd. for the year 2022

	Particulars	PY 2021	CY 2022
A	Sales volume (Tonnes)	4,20,000	4,20,000 × 112% = 4,70,400
B	Selling price per tonne (₹)	23,000	23,000
		(₹in lakhs)	**(₹in lakhs)**
C	Sales Value (A × B)	96,600	1,08,192
D	Raw Material Cost:		
(i)	Quantity of raw material (2.3 × A)	9,66,000	10,81,920
(ii)	Price per tonne	4,500	4,500
(iii)	Total raw material cost (i × ii)	43,470	48,686.40
E	Wages & Salary Cost:		
(i)	Wages to casual employees	2,386.80	2,508.47
	(15% × 6,000 × 26 × 12 = 11,112)	(11,112 ×850)	(11,112 × 893.33)
(ii)	Salary to permanent employees	47,736	51,316.20
	(85% × 6,000 × 26 = 1,32,600)	(1,32,600 × 12 × 3,000)	(1,32,600 × 6 × 3,000) + (1,32,600 × 6 × 3,450)
(iii)	Total wages and salary (i + ii)	50,122.80	53,824.67
F	Power Cost:		
(i)	For production (units)	4,20,00	4,70,400
		(7,00,000 × 60%)	(4,20,000 × 112%)
(ii)	For employee & Office (units)	2,80,000	2,80,000
(iii)	Total power consumption (i + ii)	7,00,000	7,50,400
(iv)	Power rate per unit (₹) (42,00,000÷7,00,000)	6.00	6.00
(v)	Total power cost (iii × iv)	42	45.024
G	Safety and maintenance cost	60	67.20
			(60,00,000 × 112%)
H	Diesel Cost	1.20	-
I	Car Hire charge:		
(i)	Car hire charge	6	6
(ii)	Fuel reimbursement cost	-	1.2 × 115% = 1.38
(iii)	GST @ 5% on RCM basis [(i + ii)×5%]	-	0.369
(iv)	Total car hire charge cost	6	7.749
J	Depreciation	8,040	8040 × 85% = 6,834
K	Total cost (Sum D to J)	1,01,742	1,09,465.043
L	Profit/Loss (C – L)	(5,142)	(1,273.043)

22. **Production budget (in Units)**

	April		May		June		Total	
	MM	**HH**	**MM**	**HH**	**MM**	**HH**	**MM**	**HH**
Sales	8,000	6,000	10,000	8,000	12,000	9,000	30,000	23,000
Add: Closing stock	2,500	2,000	3,000	2,250	4,000	3,500	9,500	7,750
Less: Opening stock	(2,000)	(1,500)	(2,500)	(2,000)	(3,000)	(2,250)	(7,500)	(5,750)
Production units	8,500	6,500	10,500	8,250	13,000	10,250	32,000	25,000

Production Cost Budget

Element of cost	Rate (₹)		Amount (₹)	
	MM (32,000 units)	HH (25,000 units)	MM	HH
Direct Material	220	280	70,40,000	70,00,000
Direct Labour	130	120	41,60,000	30,00,000
Manufacturing Overhead				
[(4,00,000÷1,80,000)×32,000]			71,111	
[(5,00,000÷1,20,000)×25,000]				1,04,167
			1,12,71,111	1,01,04,167

23. **Budget**

Particulars	Amount (₹)
Sale of Toughened Glass	6,00,000
Sale of Bent Glass	2,00,000
Total Sales (A)	8,00,000
Direct material cost (60% × 8,00,000)	4,80,000
Direct wages (20 × 150 × 12)	36,000
Factory Overheads:	
Indirect labour – work manager (500 × 12)	6,000
Indirect labour – foreman (400 × 12)	4,800
Stores and spares (8,00,000 × 2.5%)	20,000
Depreciation on machinery	12,600
Light & power	3,000
Repair & Maintenance	8,000
Other sundries (36,000 × 10%)	3,600
Administration, selling and distribution expenses	30,000
Total Cost (B)	**6,04,000**
Profit (A – B)	**1,96,000**

24. **Flexible Budget**

Particulars	Amount at 90%	Amount at 100%	Amount at 110%
Administration Cost			
Office salaries	90,000	90,000	90,000
General expenses	13,500	15,000	16,500
Depreciation	7,500	7,500	7,500
Rates & Taxes	8,750	8,750	8,750
Total administration cost (A)	**1,19,750**	**1,21,250**	**1,22,750**
Selling cost			
Salaries	54,000	60,000	66,000
Travelling expenses	13,500	15,000	16,500
Sales office	6,750	7,500	8,250
General expenses	6,750	7,500	8,250
Total Selling cost (B)	**81,000**	**90,000**	**99,000**
Distribution cost			
Wages	15,000	15,000	15,000
Rent	6,750	7,500	8,250
Other expenses	27,000	30,000	33,000
Total Distribution cost (C)	**48,750**	**52,500**	**56,250**
Total Cost (A + B + C)	**2,49,500**	**2,63,750**	**2,78,000**

25. **Expenses Budget**

Particulars	15,000 units	18,000 units
Direct material	15,000 × 50 = 7,50,000	18,000 × 50 = 9,00,000
Direct labour	15,000 × 20 = 3,00,000	18,000 × 20 = 3,60,000
Variable overheads	15,000 × 15 = 2,25,000	18,000 × 15 = 2,70,000
Direct expenses	15,000 × 6 = 90,000	18,000 × 6 = 1,08,000
Selling expenses – variable	15,000 × 15 × 80% = 1,80,000	18,000 × 15 × 80% = 2,16,000
Selling expenses – fixed	20,000 × 15 × 20% = 60,000	20,000 × 15 × 20% = 60,000
Factory expenses – fixed	20,000 × 7 = 1,40,000	20,000 × 7 = 1,40,000
Administration expenses – fixed	20,000 × 4 = 80,000	20,000 × 4 = 80,000
Distribution expenses – variable	15,000 × 12 × 85% = 1,53,000	18,000 × 12 × 85% = 1,83,600
Distribution expenses – fixed	20,000 × 12 × 15% = 36,000	20,000 × 12 × 15% = 36,000
Total	**20,14,000**	**23,53,600**

26. (i) Sales Budget

Particulars	November, 2020	December, 2020	January, 2021	February, 2021	March, 2021
Sales (in Units)	30,000	35,000	38,000	25,000	40,000
Selling Price per unit (in ₹)	10	12	15	15	20
Sales Value	3,00,000	4,20,000	5,70,000	3,75,000	8,00,000

(ii) Production Budget

Particulars	November, 2020	December, 2020	January, 2021	February, 2021	March, 2021
Sales Units	30,000	35,000	38,000	25,000	40,000
Add: Closing Stock Units	3,000	9,000	8,000	6,000	10,000
Less: Opening Stock Units	(7,500)	(3,000)	(9,000)	(8,000)	(6,000)
Production Units	25,500	41,000	37,000	23,000	44,000

(iii) Raw Material 'A' Budget

Particulars	November, 2020	December, 2020	January, 2021	February, 2021	March, 2021
Production Units	25,500	41,000	37,000	23,000	44,000
Raw material consumption per unit	2	2	2	2	2
Raw Material Consumption	51,000	82,000	74,000	46,000	88,000

Raw Material 'B' Budget

Particulars	November, 2020	December, 2020	January, 2021	February, 2021	March, 2021
Production Units	25,500	41,000	37,000	23,000	44,000
Raw material consumption per unit	3	3	3	3	3
Raw Material Consumption	76,500	1,23,000	1,11,000	69,000	1,32,000

27. (i) Production budget of 'X' for the Second Quarter

Particulars	Bags (Nos.)
Budgeted Sales	1,50,000
Add: Desired closing stock	33,000
Less: Opening stock	(45,000)
Required production	1,38,000

(ii) Raw material purchase budget in quantity as well as in ₹for 1,38,000 bags of 'X'

Particulars	'Y' (Mtr.)	'Z' (Mtr.)	Empty Bags Nos.
Production requirement per bag of 'X'	2.5	7.5	1.0
Requirement for production	1,38,000 × 2.5 = 3,45,000	1,38,000 × 7.5 = 10,35,000	1,38,000 × 1 = 1,38,000
Add: Desired closing stock	78,000	1,41,000	84,000
Less: Opening stock	(96,000)	(1,71,000)	(1,11,000)
Quantity to be purchased	3,27,000	10,05,000	1,11,000
Cost per tr./bag	₹160	₹30	₹110
Cost of purchase (₹)	5,23,20,000	3,01,50,000	1,22,10,000

(iii) Computation of Budgeted Variable Cost of Production of 1 Bag of 'X'

Particulars	₹
Raw Material	
Y = 2.5 mtr. × ₹160	400.00
Z = 7.5 mtr. × ₹30	225.00
Empty bag	110.00
Direct Labour (₹70 × 9 minutes/60 minutes)	10.50
Variable manufacturing overheads	60.00
Variable cost of production per bag	805.50

28. (i) Production Budget

Particulars	January	February	March	April
Budgeted Sales	5,000	6,000	7,000	7,500
Add: Closing Stock	1,500	1,750	1,875	2,000
Less: Opening Stock	(1,200)	(1,500)	(1,750)	(1,875)
Production	**5,300**	**6,250**	**7,125**	**7,625**

Working Notes:

(1) Closing stock of January = 25% × 6,000 = 1,500
Closing stock of February = 25% × 7,000 = 1,750
Closing stock of March = 25% ×7,500 = 1,875
Closing stock of April = 25% × 8,000 = 2,000

(2) Opening stock of February, March and April are taken as equal to closing stock of respective previous month.

(ii) Material Purchase Budget

Particulars	Material A		
	January	February	March
Raw material consumption ₹2 per gadget	10,600	12,500	14,250
Add: Closing Stock	3,750	4,275	4,575
Less: Opening Stock	(3,250)	(3,750)	(4,275)
Raw Material Purchase	**11,100**	**13,025**	**14,550**

Working Notes:

(1) Closing stock of material of January = 30% × 12,500 = 3,750
Closing stock of material of February = 30% × 14,250 = 4,275

(2) Raw Material consumption of Material for Month of April = 7,625 × 2 = 15,250
Closing stock of material of March of Material = 30% × 15,250 = 4,575

(3) Opening stock for material for month of February and March are taken as equal to closing stock of respective previous month.

Statement Showing Profit

Particulars	January	February	March	Total
Sales (A)	5,000	6,000	7,000	18,000
Selling price per unit	₹2,000	₹2,000	₹2,000	₹2,000
Less: Discount @15% of selling price	₹300	₹300	₹300	₹300
Less: Standard cost of manufacturing	₹1,500	₹1,500	₹1,500	₹1,500
Profit (B)	₹200	₹200	₹200	₹200
Total Profit (A × B)	₹10,00,000	₹12,00,000	₹14,00,000	₹36,00,000

29. (i) Production Budget (in units) for the year ended 31st March 2018

Particulars	Product A	Product B
Budgeted sales (units)	36,000	16,700
Add: Increase in closing stock	860	400
No. of good units to be produced	36,860	17,100
Post production rejection rate	3%	5%
Post production good units rate	100% – 3% = 97%	100% – 5% = 95%
No. of units to be produced	36,860 ÷ 97% = 38,000	17,100 ÷ 95% = 18,000

(ii) Purchase budget (in kgs and value) for Material C

Particulars	Product A	Product B
No. of units to be produced	38,000	18,000

Usage of Material C per unit of production	4 kg	5 kg
Material needed for production	1,52,000 kg	90,000 kg
Wastage % of Material C	5%	4%
Good usage % of Material C	100% - 5% = 95%	100% - 4% = 96%
Material to be purchased (in kg)	1,52,000÷95% = 1,60,000	90,000÷96% = 93,750
Rate per kg of Material C	₹45	₹45
Total Purchase cost	1,60,000×45 = 72,00,000	93,750×45 = 42,18,750

Total purchase cost = 72,00,000 + 42,18,750 = ₹1,14,18,750

(iii) A = 1,60,000 + 93,750 = 2,53,750 kg

O = ₹250

C = ₹45 × 9% = ₹4.05

$$EOQ = \sqrt{\frac{2 \times A \times O}{C}} = \sqrt{\frac{2 \times 2,53,750 \times 250}{4.05}} = 5,597 \text{ kg}$$

30. (a) Preparation of Production Budget (in units)

	October	November	December	January
Demand for the month (Nos.)	40,000	35,000	45,000	60,000
Add: 20% of next month's demand	7,000	9,000	12,000	13,000
Less: Opening Stock	(9,500)	(7,000)	(9,000)	(12,000)
Vehicles to be produced	37,500	37,000	48,000	61,000

(b) Preparation of Purchase budget for Part-X

	October	November	December
Production for the month (Nos.)	37,500	37,000	48,000
Add: 40% of next month's production	14,800 (40% of 37,000)	19,200 (40% of 48,000)	24,400 (40% of 61,000)
	52,300	56,200	72,400
No. of units required for production	2,09,200 (52,300 × 4 units)	2,24,800 (56,200 × 4 units)	2,89,600 (72,400 × 4 units)
Less: Opening Stock	(48,000)	(59,200) (14,800 × 4 units)	(76,800) (19,200 × 4 units)
No. of units to be purchased	1,61,200	1,65,600	2,12,800

(c) Budgeted Gross Profit for the Quarter October to December

	October	November	December	Total
Sales in nos.	40,000	35,000	45,000	1,20,000

Net Selling Price per unit*	₹14,57,070	₹14,57,070	₹14,57,070	
Sales Revenue (₹in lakh)	5,82,828	5,09,974.50	6,55,681.50	17,48,484
Less: Cost of Sales (₹in lakh) (Sales unit × Cost per unit)	4,57,120	3,99,980	5,14,260	13,71,360
Gross Profit (₹in lakh)	1,25,708	1,09,994.50	1,41,421.50	3,77,124

* Net Selling price unit = ₹17,14,200 – 15% commission on ₹17,14,200 = ₹14,57,050

31.

Division	Product	Budget for future period			Budget for Current period			Actual sales for current period		
		Qty.	Price	Value	Qty.	Price	Value	Qty.	Price	Value
			₹	₹		₹	₹		₹	₹
East	X	500	10	5,000	400	9	3,600	500	9	4,500
	Y	400	20	8,000	300	21	6,300	200	21	4,200
Total		900		13,000	700		9,900	700		8,700
West	X	700	10	7,000	600	9	5,400	700	9	6,300
	Y	600	20	12,000	500	21	10,500	400	21	8,400
Total		1,300		19,000	1,100		15,900	1,100		14,700
East & West	X	1,200	10	12,000	1,000	9	9,000	1,200	9	10,800
	Y	1,000	20	20,000	800	21	16,800	600	21	12,600
Total		2,200		32,000	1,800		25,800	1,800		23,400

32. (a) & (b) Statement of Cost

Particulars	60 students	90 students	120 students	150 students	180 students
Breakfast	3,000	4,500	6,00	7,500	9,000
Lunch	6,000	9,000	12,000	15,000	18,000
Tea	600	900	1,200	1,500	1,800
Entrance fee at zoo	1,200	1,800	2,400	3,000	3,600
Total Variable cost (A)	10,800	16,200	21,600	27,000	32,400
Rent	13,000	13,000	19,500	19,500	26,000
Permit fee	1,000	1,000	1,500	1,500	2,000
Teacher allowance	2,000	2,000	3,000	3,000	4,000
Total semi-variable cost (B)	16,000	16,000	24,000	24,000	32,000
Block entrance fee	2,500	2,500	2,500	2,500	2,500
Prizes	500	500	500	500	500

Particulars	60 students	90 students	120 students	150 students	180 students
Total Fixed cost (C)	3,000	3,000	3,000	3,000	3,000
Total Cost (A + B C)	29,800	35,200	48,600	54,000	67,400
Number of Students	60	90	120	150	180
Average cost per student	496.67	391.11	405.00	360.00	374.44

(c) Statement of Break-even point

Particulars	51 to 100 students	101 to 150 students	151 to 200 students
Fixed & Semi-variable cost (A)	19,000	27,000	35,000
Contribution per student (B)	400 – 100 = 220	400 – 100 = 220	400 – 100 = 220
Break-even point (AB)	86	123	159

Since 86 is not within range, therefore, Break-even points are 123 & 159 .

33. Variable overhead for each % of level of activity = $\frac{40,00,000-30,00,000}{75-50}$ = 40,000

Fixed cost = 30,00,000 – (40,000 × 50) = ₹10,00,000
Total overhead at 60% level = 10,00,000 + (40,000 × 60) = ₹34,00,000

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